ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

0 (02). HANDBOOKS. MANUALS. TEXTBOOKS

1791. TAYLOR, SIR W. L. **Estate forestry.** Crosby Lockwood & Son Ltd., London. 1951. pp. xi + 200 + 12 photos. Price 15*s.*

The author's aim is 'to help to clarify ideas', and his book is addressed to landowners, agents and estate foresters in Great Britain. It includes the following chapters: The forestry background; home forestry and its problems; national forestry and the private woods; silvicultural problems; the broad-leaved trees; Poplars and Willows; the principal conifers; some other conifers; plant supply and the estate nursery; what to plant and where; planting and regeneration; tending and maintenance; the coppice conundrum; perils, pests and protection; marketing forest products; forestry and the farm; private forestry and co-operation; will private forestry pay?; forestry and the tax collector; the forest year; the forest bookshelf. There is an appendix on the 1951 Forestry Act.

1792. **Forestry practice: a summary of methods of establishing forest nurseries and plantations with advice on other forestry questions for owners, agents and foresters.** *Bull. For. Comm., Lond.* No. 14 (5th ed.) 1951. pp. 88. Price 2*s.* 6*d.*

Since the 4th edition appeared in 1946 [cf. *For. Abstr.* 8 (No. 1690)] changes have been made in the taxation of woodlands, and in the Dedication Scheme, and certain other grants have become available to private owners of woodlands. The relevant parts of the chapter on financial questions has therefore been revised, as has that on thinning.

1793. KIERULF, T. Bondens ryggstø: samtaler mellom en gårdbruker og en fylkesskogmester om skogen og dens skjøtsel. [The peasant's prop: talks between a farmer and a county forester on the forest and its care.] Det Norske Skogselskap, Oslo. 1950. pp. 153. 23 refs. [Nor.]

A popular educational booklet on all the main aspects of farm forestry in Norway, with chief reference to the coniferous-forest regions.

0 (047.1). PROGRESS REPORTS

See also No. 2650.

1794. **State of Israel Department of Forests:** summary report for the year 1950–1951. (From the Hebrew text.) State of Israel Department of Forests, Ilanoth. 1951. pp. 6 + 15 tbls. + 4 photos.

The summary report is in English; captions to tables and photographs are in English and Hebrew. Abbreviation in *For. Abstr.*: *Summ. Rep. Israel Dep. For.*

0 (052/054). PERIODICALS

See also Nos. 1851, 1865.

1795. ***To Dasos.*** Office of Forestry Propaganda, Ministry of Agriculture, Greece. Quarterly. Price *Dr.*2000 per vol.

No. 1, 1947, contains 104 pages and is entirely in Greek. Subsequent numbers have tables of contents in English and French. There are news notes and a few reviews. Abbreviation in *For. Abstr.*: *Dasos.*

1796. CHRISTODOULOPOULOS, A. To periodikon mas. [**Our periodical.**] *Dasos* No. 1, 1947 (7–11). [Gk.]

This introduction to the first number of *To Dasos* (The Forest) reviews the history and fortunes of previous Greek forestry periodicals. The first, a monthly entitled 'The Forest and Botanical Encyclopedia', appeared in 1923 and lasted for only 4 issues. Reappearing in Jan. 1927, it ran for another 12 issues only. In 1925 a 'Monthly Forestry Periodical' was started by a committee headed by G. Michopoulos and ran for 13 years. Its name was changed in 1930 to 'The Monthly Forestry Review'. From 1925 to 1930 the Ministry of Agriculture issued 'Forestry Revival', also a monthly. In 1932 appeared 'The Forest Life', an organ of the Union of Greek Foresters, which ran for only a few years.

1797. **The Burmese Forester.** Burma Forest Service Association, Rangoon. Two issues to be published annually: annual subscription *Rs.*15.

Vol. 1, No. 1, March 1951, contains 76 pp. The important articles are in English. Abbreviation in *For. Abstr.*: *Burmese For.* Correspondence concerning subscriptions should be addressed to the Honorary Editor, Burmese Forester, c/o The Conservator of Forests, Working Plans Circle, 526, Merchant Street, Rangoon.

1798. ***Madjalah Ilmu Alam untuk Indonesia (Indonesian Journal for Natural Science).*** Perhimpunan Ilmu Alam Indonesia, Bandung. 2-monthly. Price *Rs.*12 p.a. E.M.B.

Previously *Chronica Naturae.* The first issue under the new title is Vol. 107, Nos. 1/3, Jan.–June, 1951. Articles are in Dutch or English. Abbreviation in *For. Abstr.*: *Madj. Ilmu Al. unt. Indones.*

0 - - 011. TERMINOLOGY, NOMENCLATURE

See also Nos. 1881, 1886–90, 1902, 1962, 2386, 2420.

1799. PLAISANCE, G. **Petit glossaire forestier** comtois. [**A little glossary of forestry terms from Franche-Comté.**] *Rev. for. franç.* 1951 (12), (737–52 + 4 photos). [F.]

Contains terms found in 17th and 18th century documents, with some from the modern patois.

0 - - 087. APPARATUS, INSTRUMENTS, MACHINERY: GENERAL

1800. **Equipment notes.** *Unasylva* 5 (2), 1951 (81–5).

Short descriptions, with photographs, of the following amongst others: Motorola Handie Talkie (portable two-way radio set); a trap for rainwater that can be used for helicopter landings (U.S. Forest Service); concrete planting pots (Israel Forest Service); tree planter (Forestry Equipment Co., Jacksonville, Fla.); Silver-Giant pneumatic pruning shears; 'Les Grimpettes' climbing device (apparently an improved model of the Baumvelo [cf. *For. Abstr.* 12 (No. 2885)]; Fitchburg portable wood chipper [cf. *For. Abstr.* 11 (No. 1153)]; the Automule, a caterpillar tractor that can be put on wheels for road hauling [cf. *For. Abstr.* 12 (p. 557)]; the Fleco detachable stumper, for use with a Caterpillar-tractor/bulldozer arrangement [cf. *For. Abstr.* 12 (No. 2877)]; the Drott skid-loader (Drott Manufacturing Corp., Milwaukee); a French hauling winch and a log grapple for paper factories (Beunes Avia, 55, Ave. George V, Paris, 8); Gorwood Circular 'gang' saw, multiple resaw, and foot-operated swing cross-saw (J. R. Gordon & Co., 14–16, Newgate St., Chester, England); portable stave mill (Lewis Diesel Engine Co., 92, West Caroline Ave., Memphis, Tenn.).

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.8. Climatology. Climate and Microclimate

See also Nos. 1832, 1934, 1970, 1985, 2283.

1801. MANGENOT, G. **Une formule simple permettant de caractériser les climats de l'Afrique intertropicale dans leurs rapports avec la végétation. [A simple formula defining the climates of tropical Africa in relation to the vegetation.]** *Rev. gén. Bot.* 58 (689), 1951 (353–69). 11 refs. [F.f.] O.B.D.

An attempt is made to define qualitatively the ecological conditions determining the vegetation of the plains and low mountains of tropical Africa by means of a formula based on the following factors: average annual rainfall, average rainfall of the dry season, number of dry months in the year (i.e. months with rainfall below 50 mm.), and relative humidity. The formula is not valid for regions where temperature is the limiting factor, e.g. in non-tropical regions, or at high altitudes in tropical regions.

114. *Soil. Soil Science*

See also No. 1832.

1802. ROSAYRO, R. A. DE. **The importance of soil investigations in tropical forestry with special reference to Ceylon.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (449–54). 9 refs.

1803. GALOUX, A. **Les sols forestiers de la Gaume. [The forest soils of the Gaume.]** *Bull. Soc. for. Belg.* 58 (11), 1951 (469–83 + 2 photos). [F.]

The Gaume is a region on the southern slopes of the Belgian Ardennes. The soils are varied, but are mainly brown earths and rendzinas. Their formation, profiles, vegetation etc. are described in detail. It is concluded that Oak should be encouraged on the better sites at the expense of Beech.

114.1. Soil Physics

See also No. 1808.

1804. KOZLOV, V. P. **K voprosu obrazovanija struktury počv v uslovijah lesnoĭ rastiteljnosti. [The formation of soil structure under forest vegetation.]** *Počvoved.* 1951 (8), (493–6). 8 refs. [Russ.] A.P.B.

Tests were made of the water-stability of soil aggregates under forest (Oak/Lime on grey forest clay-loam soil and Spruce with *Oxalis* in the ground layer, on sod-podzol clay-loam, both in Moscow province; and Oak/Hornbeam on a heavy dark-grey forest clay-loam in the Ukraine) and on the same soils on adjacent arable land. Results are tabulated. They show that the stability of soil aggregates under forest is considerably higher, especially in the upper horizons, than in the arable soils. Maximum stability was shown by the soil aggregates of the uppermost layer of the A_1 horizon under forest; these stable surface aggregates are presumably the remains of worm casts, which are concentrated at the surface.

1805. BYRNES, W. R. **Effect of soil texture on occurrence and type of ground freezing.** *Abstr. of thesis*, in *J. For.* 49 (11), 1951 (786). [Department of Forestry, Pennsylvania State College.]

Comparison was made of a loamy sand, a silt loam, and a clay loam. At 0 and at 15° F. the concrete type of frost structure occurred in the mineral soil of all three textures, regardless of whether they were at field capacity or saturation. It was shown, however, that litter and humus layers are effective in preventing the occurrence of concrete frost, and even when frozen are capable of absorbing a certain amount of water, whereas concrete frost in the mineral soil is completely impermeable.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 1805, 1809, 1818, 1825, 1848.

1806. BROADFOOT, W. M. **Soil rehabilitation under Eastern Redcedar and Loblolly Pine.** *J. For.* 49 (11), 1951 (780–1). 5 refs.

Tabulates and discusses differences in properties of litter and top 2 in. of soil under *Pinus taeda*, *Juniperus virginiana* and herbaceous cover. *P. taeda* produces considerable quantities of litter in a short time, but soil beneath *J. virginiana* develops more desirable characteristics.

1807. LAFOND, A. **Oxidation-reduction potential as a characteristic of forest humus types.** *Proc. Soil Sci. Soc. Amer. 1949*, 14, 1950 (337–40). 9 refs. L.S.

The oxidation/reduction potential was determined on a considerable number of samples belonging to the three broad groups of forest humus: (1) earth mull, (2) duff mull, and (3) mor. The results suggest that there are marked differences between the oxidation/reduction potential of freshly collected samples of mull and mor humus types. There is a lack of correlation between the level of the oxidation/reduction potential and the pH value of samples, which is of particular significance. As a rule, mull humus showed a positive redox potential in spite of strong acidity, and mor humus showed a negative potential in spite of mild acidity. The transitional type of duff mull, formed in part by free organic matter and in part by incorporated humus, exhibited variable characteristics. Periodic determination of the oxidation/reduction potential of fermented humus samples, as well as potentiometric titration, suggested radically different behaviour of the two main types of humus. It is believed therefore that oxidation/reduction characteristics may serve as a criterion in the classification of forest humus.

1808. HÄGGSTRÖM, B. Bestämning av vattenhalten i några nordsvenska råhumustäcken. **[Determining the water content of some raw-humus covers in northern Sweden.]** *Svenska SkogsvFören. Tidskr.* 48 (2), 1950 (215–27). 13 refs. [Sw.sw.g.]

Samples from the raw-humus layer were taken at intervals of 2 days between 8th June and 19th July, 1948, from 12 plots in Lycksele. A table is given showing the vegetation, the forest and soil types, and the thickness of the humus and bleached-earth layers for each plot. The samples were weighed, dried in a thermostat and reweighed to obtain the moisture content, and results are shown in graphs together with figures for rainfall and temperature during the period. The figures show that: (1) the water content on all the plots was considerably below the optimum for the breakdown of humus; (2) the available moisture in the moist *Calluna/Vaccinium* types was barely enough, and in the dry types was not enough for germination of Pine and Spruce; and (3) there was a good correlation between the thickness of the bleached-earth layer and the moisture content of the raw humus.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 1975, 2044, 2125, 2142, 2221–4, 2314, 2331–4.

1809. GOOR, C. P. VAN. De productiecapaciteit van de zandige bruine bosgronden. **[The productivity of sandy, brown forest soils.]** *Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 9, 1951. pp. 31. 7 refs. [Du.e.]

Stresses the distinction between the variable and the constant or decisive properties of soil types: it is the former that are involved in processes of degradation or restoration, thus determining the actual soil productivity as contrasted with its potential productivity under optimum conditions. Illustrates this theme by data from a study of soil profiles—with details of physical and chemical properties of the various horizons—and tree measurements in 4 Oak stands, belonging ecologically to (1) the *Querceto-Carpinetum typicum* and (2) the *Q.-roboris-Betuletum typicum*, on a sandy, brown forest soil in different stages of degradation. Differences were found in depth and colour of the A horizon, structure, pH, and chemical properties, and the only constant properties were mineralogical and mechanical composition and the characteristic succession of horizons. Some 40–50 years before, the areas had been worked as Oak coppice, and conditions in them are believed to have been more or less uniform at that date, when they were all converted to high forest. The superior productivity of (1), evident in both tree growth and soil characters, is attributed to the two plots having received considerable garden rubbish (plant residues and weeds) in one case, and farm wastes (a certain amount of straw, and visits by chickens) in the other, thus providing favourable conditions for the soil organisms responsible for the breaking down and incorporation of humus, which is of great importance for soil regeneration in the type concerned. It is emphasized that the usual soil-type map does not indicate actual soil conditions within the types. Actual soil productivity is, however, reflected in the plant communities present, a point confirmed by a vegetation analysis (merely mentioned in the present paper) of the areas studied. It should therefore be possible to use the soil map plus a vegetation map as the basis for measures leading to sustained maximum productivity.

1810. TAMM, C. O. **Chemical composition of Birch leaves from drained mire, both fertilized with wood ash and unfertilized.** *Svensk bot. Tidskr.* 45 (2), 1951 (309–19). 17 refs. [E.] O.B.D.

A study on drained peatbog under 4 treatments [cf. *For. Abstr.* 9 (No. 2053)], viz. (1) unfertilized, (2) moderately fertilized with wood ash in 1918, (3) part of (2) re-fertilized in 1949, and (4) heavily fertilized with wood ash in 1926. The N, P, K and Ca contents of leaves of *Betula verrucosa* and *B. pubescens* were investigated. Birch leaves collected from the same area in two different years had, on the whole, a very similar composition. In (3), however, K and Ca contents of leaves were greatly increased after re-fertilization, but N and P showed no increase. The P and Ca contents in (1) and (2) were much the same; K content was slightly higher in (2) than in (1). In (4) P, Ca and K were all significantly higher than in (1) and (2), 24 years after treatment. N content, however, was higher in (2), low in (1), and intermediate in (4). These results indicate that Birch leaf composition can be a sensitive indicator of site properties, though it cannot be relied upon always to reflect the absolute amount of nutrients available per unit area. [Cf. *For. Abstr.* 13 (Nos. 1849, 2126).]

1811. KUŹNIAR, K. Nowe metody określania aktywności gleby leśnej. **[New methods of determining the activity of forest soil.]** *Sylwan* 94 (3), 1950 (49–57). 5 refs. [Pol.russ.e.]

Describes new methods of determining the activity (fertility) of forest soil, based on the decomposition of cellulose and cellophane, and worked out at the Department of Soil Science, Forest Research Institute, Cracow, in 1947–8. The field method consisted in burying in the soil a cellulose specimen (filter paper) fastened to a glass plate by a thread. A year later the specimen was carefully taken out and the % of decomposed cellulose determined. Laboratory tests were done with cellulose samples placed in Petri dishes and covered in the field with a layer of soil pressed into the dish. In one series of experiments the soil moisture was held at the initial level; in another, the soil was moistened up to a desired %. In a series of experiments, both in the field and laboratory, cellophane was substituted for filter paper. Owing to its transparency, the development of the mycelium was visible, and the degree of fungal attack could be recorded as if on a photographic plate. [Cf. *For. Abstr.* 10 (No. 1578).]

1812. ALEXANDROWICZ, B. W. Roslinność dna lasu. **[Ground vegetation of the forest.]** Instytut Badawczy Leśnictwa, Warszawa. 1951. pp. 264. 29 refs. [Pol.]

A practical guide for forest assessors, with descriptions and illustrations of 162 species of lichens, mosses, ferns, horsetails, club mosses, grasses, sedges, rushes and other flowering plants, including herbs and low shrubs, of use as site indicators in Polish forests. Tables are annexed showing the optimum habitat conditions for all species concerned (soil moisture, light, clay, lime, humus), and the forest types (Vacciniosa and Urticosa, from very dry to boggy sites) in which they occur.

1813. MATUSZKIEWICZ, W. Roślinność lasów okolic Lwowa. **[The vegetation of the forests round Lvov.]** *Ann. Univ. M. Curie-Skłodowska, Lublin (Ser. C.)* 3 (5), 1948 (119–93 + 5 tbls.). 23 refs. [Pol.e.] C.G.B.

Presents the results of observations carried out in 1941–6 on the ground flora (the two lowest forest storeys) in relation to ecological factors. The various vegetation types are reviewed on the basis of some floristic analyses, the following shaping factors being taken into account: soil fertility, hydrological factors, soil structure, light, other climatic factors, and man.

1814. ATTENBERGER, J. Die Bodenvegetation als Standortweiser in Fichtenreinbeständen der Münchener Schotterebene. **[Ground flora as a site indicator in pure Spruce stands of the gravelly plains round Munich.]** *Forstwiss. Cbl.* 70 (10), 1951 (587–604). 8 refs. [G.]

A study was made of plant associations in pure Spruce stands in order to see whether some relationship could be established between the plant associations, the history of the stand, and geological, edaphic and topographical factors. Sample plots were set up and species associations defined and mapped. An examination of the results shows that a close relationship exists between species associations, the site, and the history of the stand, and that such studies can be useful in assessing site quality in secondary forest.

1815. AALTONEN, V. T. De finska skogstyperna i markforskningens ljus. **[The Finnish forest types in the light of soil research.]** *Svenska SkogsvFören. Tidskr.* 49 (3), 1951 (228–42). [Sw.]

Summarizes present information, from individual research and State surveys, on the relationship between different characteristics (physical properties, depth of the humus layer and the A horizon, and chemical and microbiological properties) of the soil, and the occurrence of Cajander's forest types.

1816. WESTVELD, M. **Vegetation mapping as a guide to better silviculture.** *Ecology* 32 (3), 1951 (508–17). 14 refs.

The author describes two schemes for reconstructing the original forest associations in the Spruce/Fir and northern hardwood regions of the North-East U.S.A.: (1) through interpretation of the existing forest cover types, and (2) through the use of indicator plants that form part of the minor vegetation in the forest. He presents a site-type classification showing what species should be favoured on sites characterized by certain ground-vegetation types. Techniques of site-type mapping are described briefly. *From author's summary.*

114.6. Soil Biology

See also Nos. 1804, 1811, 1858, 1945, 1958.

1817. WINOGRADSKY, S. Microbiologie du sol: problèmes et méthodes: cinquante ans de recherches. **[Soil microbiology: problems and methods: 50 years of research.]** Masson & Cie., Paris. 1949. pp. 862 + 35 plates. Many refs. [F.] Price *Fr.*3000 [£3. 8*s*. 6*d*.]

The author has here collected all his published work on the subject, covering a period of 50 years, arranged it in groups, and written an introductory note to each. The main groups are: Autotrophic bacteria (pp. 16–63); The morphology of the bacteria (pp. 68–149); Nitrification (pp. 155–351); Anaerobic fixation (pp. 356–402); Retting of flax (pp. 405–9); Methods of soil microbiology (pp. 415–510); Degradation of cellulose in the soil (pp. 516–581); The Azobacters (pp. 587–806); Symbiotic fixation (pp. 810–48).

1818. DUCHAUFOUR, P. Sur la minéralisation de l'azote dans les humus forestiers. **[The 'mineralization' of nitrogen in forest humus.]** *C. R. Acad. Agric. France* 37 (15), 1951 (567–71). [F.] A.P.B.

Samples from the A_1 horizon of 8 forest soils with pH varying between 7·5 and 4·1 were placed in wire-gauze baskets and kept for 6 weeks in an oven at a constant temperature of 28–30° C. The atmosphere of the oven was maintained at saturation point, and the moisture content of the soil at about 60–70%. Total N contents and contents of NH_4 and NO_3 compounds were recorded every week and the results plotted. Three series of experiments were made:—(1) In spring, with no previous soil treatment. (2) In summer, ditto. (3) In summer after the soil had been kept for 1½ months in a cold chamber at 4° C.

In most cases mineralization began during the second week and reached its highest point during the fourth or fifth week. The most active soils were those having a pH of 5–6·5. The activity of very acid soils is high, however, especially in spring, and is attributed to the decomposing effects of fungi. This would explain the very rapid decomposition of acid humus soils under tropical conditions. Activity was at its minimum in limestone soils. It was greater in spring than in summer. Amounts of mineral N decreased considerably during the cold-chamber treatment, but the activity of such soils during the oven treatment much exceeded that in series (1) and (2). This would explain the rapidity of humus decomposition in mountainous areas after clear felling, the process having been accelerated by microclimatic changes. The acceleration of activity was smaller in limestone soils than in mildly acid ones.

1819. Microbiologie des sols forestiers. **[The microbiology of forest soils.]** *Rapp. Inst. nat. Étude agron. Congo belge 1950*, 1951 (62–3). [F.]

A study was made of the soil microflora (1) under a stand dominated by *Cynometra*, and (2) in a natural clearing. The upper layers of (1) showed a slightly denser microflora and relatively fewer actinomycetes. Consumption of O_2 in the soil, as measured with a Haldane differential respirometer, was found to be more active in (1) than in (2). The temperature of the soil microflora was relatively low.

Another study was made of two soil profiles, (*a*) under Cypress [probably *C. lusitanica*], and (*b*) under grass (*Digitaria abyssinica*), with the following results: There is a clear seasonal variation in the abundance of the microflora, and also in its composition—during the rainy season bacteria, and during the dry season actinomycetes, are the more numerous. The total microflora is more abundant in (*b*) than in (*a*). The flocculation zone is lower in (*b*) than in (*a*). The principal soil fungi in decreasing order of abundance were *Penicillium* spp., *Coniothyrium* spp., *Verticillium puniceum*, *Aspergillus* spp. and *Mucor* spp. for superficial layers of (*b*) and *Penicillium* spp., *Trichoderma* sp. and *V. puniceum* for those of (*a*).

1820. LAUDELOT, H., and MEYER, J. **Temperature characteristics of the microflora of Central African soils.** *Nature, Lond.* 168 (4279), 1951 (791). 2 refs.

1821. RABELER, W. Biozönotische Untersuchungen im hannoverschen Kiefernforst. **[Ecological investigations in a Pine forest in Hanover.]** *Z. angew. Ent.* 32 (4), 1951 (591–8). 3 refs. [G.g.]

Presents some results of a study (begun in 1932–3 and continued in 1935) of the fauna of a Pine stand situated on sand dunes in the Ems region. The fauna shows a close resemblance to that of the *Quercus robur*/Birch forests of the same region.

1822. RONDE, G. Vorkommen, Häufigkeit und Arten von Regenwürmern in verschiedenen Waldböden und unter verschiedenen Bestockungen. 1. Untersuchungen in einem Forstbetrieb des Oberbayrischen tertiären Hügellandes. **[Occurrence, population densities and species of earthworm in different forest soils and under different cover types. 1. Investigations in a forest enterprise of the upper Bavarian Tertiary uplands.]** *Forstwiss. Cbl.* 70 (9), 1951 (521–52). Numerous refs. [G.g.]

Results of counts made on plots of 1 sq.m. are tabulated and mapped. Eight kinds of vegetation were chosen for the study:—(1) natural Alder/Ash forest, (2) natural Alder margins and strips, (3) natural fresh to moist Oak/Ash forest, (4) natural fresh Oak/Hornbeam, (5) natural Beech/Silver Fir/Oak, (*a*) with and (*b*) without a superficial deposit of loess, (6) natural Oak/Scots Pine/Hornbeam, (7) natural dry Pine/Oak/Birch, and (8) afforested agricultural land. The following conclusions were drawn:—Spruce and Scots Pine affect earthworm populations unfavourably. Beech and other broad-leaved trees are favourable to them. Ground flora is an important factor. *Sambucus* sp. and *Oxalis acetosella* give favourable conditions; *Carex* spp. do not affect populations unfavourably. Moss cover is important. Worms were present under *Polytrichum formosum*, *Dicranum undulatum*, *Mnium undulatum*, *M. affine*, *Scleropodium purum* and *Hypnum schreberi*, but were few or absent under *Mastigobryum trilobatum*, *Sphagnum* sp. and *Leucobryum glaucum*. The forest cover influences earthworm populations mainly through its effects on the ground flora and on the formation of litter.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 2045, 2102 *et seq.*, 2158.

1823. STEBBING, E. P. **Forest catchment areas and water supplies.** *Indian For.* 77 (1–4, 6–7, 10–12), 1951 (5–23; 90–108; 153–75; 216–46; 374–92; 427–49; 620–34; 684–98; 729–39).

Analyses and sets out the data obtained in answer to a questionnaire sent to the heads of the forest services throughout the world, with the exception of Western Europe:—(1) The names of the chief rivers and the length in miles from the source to mouth where they flow into the sea. (2) The names of the chief tributaries of these rivers and the length of each tributary from source to where it joins the main river. (3) The amount of forest still standing on the upper reaches in the mountains and hills of the main rivers from their source down. (4) The amount of forest still standing on the main tributaries of each of the main rivers.

1824. GRIFFITH, A. L. **The technique of soil erosion surveys in large and small catchments.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (258–71).

A general account of procedures, based essentially on U.S. experience.

1825. **[Erosion; leaching and podzolization; land use.]** *Rev. for. franç.* 1951 (10), (609–72). [F.]

A special number with articles on soil erosion in general; torrent erosion in mountain areas; hydro-electric schemes and soil erosion; leaching and podzolization; land use.

1826. CARULLO, F. **La sistemazione idraulico-forestale dei bacini montani e leggi 10 agosto 1950, n. 646 e 647. [The hydrological and silvicultural management of mountainous catchments [in Italy]**

and the laws, Nos. 646 and 647 of 10 Aug. 1950.] *Ital. for. mont.* 6 (5), 1951 (217–31). [It.it.f.]

Briefly reviews Italian legislation on the subject and then discusses the application of the special laws instituting public works in mountain catchments in 1950, and the organization and financing of such works.

1827. HORATIIS, M. DE. Le sistemazioni idraulico-forestali in Italia. [**Forestry and water-catchment regulation in Italy.**] *Ital. for. mont.* 6 (5), 1951 (232–8). [It.it.f.e.]

A conference paper summarizing legislation, its application, and reasons for comparative failure to achieve its objects.

1828. PEREZ - URRUTI Y VILLALOBOS, J. A. Trabajos hidrológico-forestales: fijación de terrenos. [**Forest hydrology—soil stabilization.**] Sección de Publicaciones de la Escuela Especial de Ingenieros de Montes, Madrid. 1948. pp. 127 + 19 plates. [Span.]

A fairly comprehensive study of the most important aspects of soil erosion, with particular reference to the influence of forests on erosion and the water regime, and to torrent training, silting up of watercourses and reservoirs, landslides, dune formation and flooding. Special consideration is given to Spanish conditions and numerous examples from Spain are quoted. Work accomplished abroad is briefly summarized, together with the achievements of the hydrological departments of the Spanish Agricultural and Forest Services.

1829. WALDOCK, E. A., CAPSTICK, E. S., and BROWNING, A. J. **Soil conservation and land use in Sierra Leone.** Printed and published by the Government Printer, Sierra Leone. Obtainable from the Crown Agents for the Colonies, London. 1951. pp. iv + 124. Price 7*s.* 6*d.*

The terms of reference of the team which prepared this report were: (1) to describe in general terms, with maps (not yet ready), the natural features and resources of Sierra Leone that have a bearing on soil conservation and land use; (2) to survey current systems and general trends of land use with special reference to their effects on soil and water conservation; (3) to record, in order of urgency, areas already seriously eroded or degraded and areas considered to be in danger of such deterioration in the near future, with special reference to land management and crop adaptation; (4) to report on water supplies, their use and conservation with special reference to the areas recorded in (3); (5) to make recommendations for technical and administrative measures necessary to halt dangerous developments already in progress and prevent further such developments.

Among topics of special forestry interest are: shifting cultivation (pp. 19–25), swamp development, including Mangrove swamps (pp. 45–7), forestry in general, including fire control (pp. 65–74).

Recommendations include the following: Large plantations of trees should not be made on level ground where this may force the farmers on to the hills. Clearing of brush should be done in strips running across slopes; whole hillsides should never be cleared. Brush should not be cleared in gullies and wet-season watercourses. Trees should be felled across, not down slopes. Brushwood and other debris on upland farms should be piled along the contours. A scheme of forest reservation, with the ultimate aim of reserving 5,000 sq. miles of forest, is outlined.

1830. TONDEUR, G. Rapport annuel de la mission anti-érosive pour l'exercice 1950. [**Annual report of the anti-erosion mission [in the Belgian Congo] for the year 1950.**] *Bull. agric. Congo belge* 42 (4), 1951 (803–30). [F.flem.]

Extracts from the annual report, including details of afforestation operations.

1831. **A water policy for the American people: the report of the President's Water Resources Policy Commission. Vol. 1, General Report. Vol. 2, Ten rivers in America's future. Vol. 3, Water resources law.** U.S. Government Printing Press, Washington, D.C. 1950. pp. 445 + 801 + 777 + 103 photos + 20 maps. Many refs. L.A.L.

1832. **Some aspects of watershed management in southern California.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 1, 1951. pp. 29.

A reprint of seminar discussions on the climate of southern California; geology and soils; vegetation (chaparral, woodland and forest formations, and the recovery of chaparral after fire); the hydrological cycle; and some results of hydrological research (run-off, erosion, and infiltration studies, watershed studies, and the effects of forest fire on flood peaks and erosion rates) mainly in the San Dimas experimental area.

1833. **Snow observations, Snake River, 1950.** *Rep. Intermt. For. Range Exp. Sta. 1950*, 1951 (47–8).

The effect of forested and open areas on interception and melting of snow was studied during the winter, spring and early summer, on plots ranging in height from 4,000 to 9,600 ft. Surveys were made at monthly intervals and during the spring melt. Some measurements were made weekly. Interception of snow by forests at the start of the spring melting varied widely with the type of cover: closed sapling stands averaged 1 in. less water equivalent than adjacent openings, closed pole stands 4 in. less, open mature stands 7 in. less, and closed mature stands 14 in. less. Most of the sapling and pole stands were of Lodgepole Pine, and the mature stands of Ponderosa Pine, Douglas Fir, Alpine Fir and Engelmann Spruce. The melting rate of the snow in the forest averaged about 70% of that in the open. Daily amounts varied in the forest from 0·2 to 1 in., in large level openings from 0·5 to 1·5 in., and in small tree-shaded clearings from 0·4 to 1·2 in. Soil moisture samples were taken on the plots between March and September; in the autumn, only some samples showed a difference in soil moisture between forest and open areas, averaging 4% more water in the open for the top 2–3 ft. of soil. The total volume of timber (including non-merchantable) on an area appears to be related to melting rates of snow, and the crown density is correlated with interception losses.

1834. HOOVER, M. D. **Hydrologic characteristics of South Carolina Piedmont forest soils.** *Proc.*

Soil Sci. Soc. Amer. 1949, 14, 1950 (353–8). 6 refs. L.S.

1835. HAAN, J. H. DE. **Scientific investigations concerning adequate water and land use.** In *Adequate Water and Land Use*, O[rganisation for] S[cientific] R[esearch, Indonesia]. 1951. pp. 4. [E.] (*Repr.* from *O.S.R.-News, Djakarta* 2 (10), 1950 (129–32).)

A brief historical review of hydrological research in Indonesia, with an account of methods and equipment used in the Forest Service Experimental areas before 1941.

1836. BAKKER, A. J., and WIJK, C. L. VAN. **Infiltration and run-off under various conditions on Java.** In *Adequate Water and Land Use*, O[rganisation for] S[cientific] R[esearch, Indonesia.] 1951. pp. 14. 14 refs. [E.e.]

A resumption of observations in the Tji Widej experimental area [cf. *For. Abstr.* 3 (197)] showed that infiltration on deforested slopes 4 years after felling was about half that on areas under tropical rain forest; the reduction was less serious on areas terraced after felling. In the forested area 90%, in the unterraced deforested area 40%, and in the terraced area 60% of a 50 mm. shower was retained more than 3 days. Results are given in graphs and tables.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 2283 *et seq.*, 2560 *et seq.*

1837. ROONWAL, M. L., BHASIN, G. D., PANT, G. D., and MISRA, S. D. **A systematic catalogue of the main identified entomological collection at the Forest Research Institute, Dehra Dun, Parts 4–8. Orders Orthoptera (concluded), Dermaptera and Plecoptera.** *Indian For. Leafl.* No. 121 (Pt. 2), 1951 (8–38). Also in *Indian Forester* 77 (5), 1951 (313–42).

Cf. *For. Abstr.* 12 (No. 2806).

1838. EMERSON, A. E. **Termite studies in the Belgian Congo.** *Rapp. Inst. Rech. sci. Afr. cent., Bruxelles 1949*, 1951 (149–59 + 8 photos). [E.]

Speculations on the evolution and distribution of the termites, based on observations made in the Belgian Congo.

1839. NIXON, G. E. J. **The association of ants with aphids and coccids.** Commonwealth Institute of Entomology, London. 1951. pp. 36. Numerous refs. Price 5*s*.

A review of world literature since 1882 and a discussion of the nature of the association.

1840. KENNEDY, J. S. **Benefits to aphids from feeding on galled and virus-infected leaves.** *Nature, Lond.* 168 (428), 1951 (825–6). 3 refs. [Agricultural Research Council, Unit of Insect Physiology, Zoological Laboratory, Cambridge.]

Experiments with several species of aphid have shown that the gall tissues caused by their feeding are apparently both attractive and beneficial to the insects themselves, and so are leaves infected by them with virus diseases. The mosaic disease of beet, for example, apparently renders the whole plant, not merely the leaves, more suitable for the aphid vector.

1841. ROBERT, A. Variation de l'époque des métamorphoses chez les charançons de l'orme (*Magdalis barbita* Say et *M. armicollis* Say). [**Variations in seasons of metamorphosis in *Magdalis barbita* and *M. armicollis*.**] *Annales de l'ACFAS, Montréal* 15, 1949 (88–90). [F.] L.S.

Notes variations in different areas and in different years.

15. ANIMAL ECOLOGY (INCLUDING GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING)

See also Nos. 1821, 2278–82.

1842. LACK, D., and LACK, E. **Further changes in bird-life caused by afforestation.** *J. Anim. Ecol.* 20 (2), 1951 (173–9). 7 refs.

Further changes in the bird-life of the Breckland, consequent on the growth of Pine plantations, are described for both summer and winter, and summarized. Various differences were found in the bird-life of Scots and Corsican Pine. The titmouse population of the Breckland differed markedly in two winters. The winter populations of conifer plantations in other parts of Britain are summarized. In general, all heathland birds disappear within a few years of afforestation of heathland, and the scrub birds that replace them are in turn replaced after a few years by tree birds. [Cf. *For. Abstr.* 1 (p. 249).]

1843. CHAMPION, F. W. **Tropical forestry and wild life.** *Oryx* 1 (4), 1951 (192–4).

Discusses problems of reconciling wildlife management with good forestry.

1844. FREEBURN, C. C. **Co-operatively developing forest-wildlife resources on the Allegheny National Forest.** *Trans. N. Amer. Wildlife Conf.* No. 16, 1951 (491–5). B.A.P.

Summarizes briefly a programme initiated in 1949 by agreement between the U.S. Forest Service and the Pennsylvania Game Commission for managing under a joint scheme both the wildlife resources and the timber and other natural resources of the forest.

1845. ARNER, D. H. **Experimental plantings on power line rights-of-way and woodland roads.** *Trans. N. Amer. Wildlife Conf.* No. 16, 1951 (331–8). 1 ref. B.A.P.

A series of sowings were made on two power-line rights-of-way and several woodland roads in Maryland, in order to find: whether grasses and legumes beneficial to wildlife would grow on such land; to what extent natural successions would be retarded by such sowings; the cost of bulldozing and sowing vs. cost of spraying and cutting to keep down woody vegetation; and what techniques could be used in planting abandoned roads for the benefit of wildlife. After three growing seasons it was evident that the power-line rights-of-way sown with a mixture of grass and legumes at 15 lb./acre were giving valuable wildlife cover and reducing costs of clearing and maintenance. A combination of spraying and bulldozing is recommended for initial clearance. Good cover was also obtained on old

woodland roads which had been turned over with a cultivator, limed and sown with grass and legume mixtures. [Cf. *For. Abstr.* 13 (Nos. 2238–9).]

1846. EDMINSTER, F. C. **Use of shrubs in developing farm wildlife habitat.** *Trans. N. Amer. Wildlife Conf.* No. 15, 1950 (519–50). B.A.P.

Recommends some species suitable for planting in the Northeastern States, the most important of which are: *Cornus amomum, Elaeagnus umbellata, Lespedeza bicolor, Lonicera tatarica, Myrica carolinensis, Rosa multiflora* and *Salix purpurea.*

1847. HEROLD, W. Hecke und Feldgehölz als Wohn- und Zufluchtsraum für nützliche und schädliche Tiere. **[Hedges and spinneys as dwelling-places and refuges for useful and harmful animals.]** *Dtsch. Landwirtsch.* 2 (9), 1951 (480–4). 17 refs. [G.]

Hedges and small farm woodlands afford better cover than extensive forests to a large variety of wildlife, partly because of the greater number of plant species assembled in a small area, and partly because of their usually wide margins of herbaceous plants. The ecology of such hedges and woodlands is discussed, and the various animals using such cover are enumerated, with notes on their behaviour.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 1810, 1948–9, 2428 *et seq.*, 2627, 2631–40.

1848. UGARTE LAISECA, J. Fitoquímica forestal. Apéndice. **[Plant chemistry in the forest. Appendix.]** [*Bol.*] *Inst. for. Invest. Exp. Madrid* 22 (58), 1951. pp. 56. [Span.span.g.e.f.]

Presents: (1) a list of ash contents of various tree species in % of dry weight, and (2) contents of certain chemicals in soils bearing different species, side by side with a list showing % of the same substance in the ash content of certain of the same species plus some additional ones. These lists supplement those of the previous parts of this work, and also include some revised figures. [Cf. *For. Abstr.* 12 (No. 925).]

1849. TAMM, C. O. **Seasonal variation in composition of Birch leaves.** *Physiol. Plant., Copenhagen* 4 (3), 1951 (461–9). 10 refs. [E.] [Forest Research Institute of Sweden.]

A study was made of the seasonal variation in *Betula verrucosa* leaf content of N, P, K, and Ca, expressed as % dry weight. It was found that N, P, and K were higher in early summer and fell later. The N and P content fell rapidly in June, remained almost constant during July, August and September, and again fell rapidly after the leaves turned yellow. The decline in K in green leaves was almost continuous over the same period, while Ca content steadily increased. It is clear that leaf samples for foliar analysis should be collected as nearly as possible at the same date. [Cf. *For. Abstr.* 13 (No. 1810).]

1850. NARAYANAMURTI, D., and SINGH, J. **Proteins of the seeds of some Indian forest trees: *Cassia tora, Terminalia belerica* and *Duabanga sonneratioides.*** *Indian For.* 77 (12), 1951 (758–62). 7 refs.

161. *Physiology*

See also Nos. 1877–8, 1943, 1960–1, 1976, 2223, 2411

1851. **Annual review of plant physiology.** No. 2, 1951. pp. 361. Many refs. Annual Reviews Inc., Stanford, Calif.

Includes the following review articles, containing references to many forest species: Mechanism of absorption and transport of inorganic nutrients in plants (*R. N. Robertson*); The rôle of the mineral elements in plant nutrition (*E. J. Hewitt*); A critical survey of the physical background of photosynthesis (*J. Franck*); The kinetics and chemistry of photosynthesis (*H. Gaffron* and *E. W. Fager*); Biosynthesis of chlorophyll and related pigments (*S. Granick*); Respiration (the Pasteur effect in plants) (*J. S. Turner*); Formation, occurrence, and inactivation of growth substances (*P. Larsen*); Herbicides and selective phytotoxicity (*G. E. Blackman, W. G. Templeman,* and *D. J. Halliday*); Nutritional requirements of isolated plant tissues and organs (*P. R. White*); Frost, drought, and heat resistance (*J. Levitt*). Experimental morphogenesis in vascular plants (*R. H. Wetmore* and *C. W. Wardlaw*); Gas damage to plants (*M. D. Thomas*); Permeability (*H. O. Steinbach*).

1852. WARAKOMSKA, Z. Obserwacje nad wartością osmotyczną drzew w lasach Białowieży. **[Observations on the osmotic value of the trees of the forests of Białowieża.]** *Ann. Univ. M. Curie-Skłodowska, Lublin* (*Ser. C*) 4 (17), 1949 (375–94). 83 refs. [Pol.f.] C.G.B.

The osmotic value (osmotic pressure of cell sap in the presence of limiting plasmolysis, i.e. in the complete absence of turgescence) of 22 tree species was determined for the following forest types within the National Forest of Bialowieża: *Pinetum typicum, Piceeto-Pinetum, Querceto-Piceeto-Pinetum, Pseudo-Quercetum, Carpinetum typicum, Querceto-Carpinetum, Fraxineto-Piceeto-Alnetum,* and *Caricetum.* It was found that the osmotic value varied considerably with the species and the site, but the results obtained were fairly reproducible. The species tested can be divided into those with a high osmotic value (14–29 atm.)—*Salix repens* var. *rosmarinifolia, Juniperus communis, Pinus sylvestris, Betula pubescens, B. humilis, B. verrucosa, Populus tremula, Ribes rubrum, Picea abies, Quercus robur, Rhamnus frangula* (in order of decreasing osmotic value); those with a medium value (7·8–11·6 atm.)—*Sorbus aucuparia, Salix aurita, Corylus avellana, Tilia cordata, Prunus padus, Ulmus scabra*: and those with a low osmotic value (3·7–6·8 atm.)—*Fraxinus excelsior, Carpinus betulus, Acer platanoides, Euonymus europaeus, Alnus glutinosa.* From comparison of the osmotic value with ecological factors, it is concluded that the osmotic value portrays fairly accurately the water-absorption opportunity of the plant.

1853. KRAMER, P. J. **Effects of respiration inhibitors on accumulation of radioactive phosphorus by roots of Loblolly Pine.** *Plant Physiol.* 26 (1), 1951 (30–6). 8 refs. [Duke University, Durham, N.C.] O.R.E.

The effects were studied of 0·001*M* NaN_3, 0·005*M* NaF and 0·025*M* malonic acid, at various pH values, on the accumulation of P^{32} by mycorrhizal and non-mycorrhizal roots of *Pinus taeda*. Roots were exposed to the inhibitors for an initial period of *ca.* 1 hr., and then exposed for 3 hr. to the inhibitor plus P^{32} to produce an activity of about 300 microcuries/litre. NaN_3 reduced accumulation more in non-mycorrhizal than in mycorrhizal roots at all pH values. The inhibition was almost complete at pH 4·7 but much less at pH 5·7. NaF almost completely inhibited accumulation at the lower pH but increased it above the control rate at the higher pH. Malonic acid did not significantly reduce accumulation at the lower pH, but increased it above the control rate at the higher pH. The pH of the system has a marked effect on the action of all three inhibitors. In general, Pine roots seem to react to respiration inhibitors in about the same manner as barley and tomato roots. It was concluded that, although both types of Pine roots contain a respiratory enzyme system sensitive to NaN_3 and NaF, that of non-mycorrhizal roots is much the more sensitive. It also appears that the two types of root are somewhat different physiologically. [Cf. *For. Abstr.* 12 (Nos. 59, 2616).] *From author's summary.*

1854. ZELLER, O. Über Assimilation und Atmung der Pflanzen im Winter bei tiefen Temperaturen. **[Assimilation and respiration of plants in winter at low temperatures.]** *Planta* 39 (6), 1951 (500–26). Numerous refs. [G.g.] O.B.D.

The study includes measurements made on *Picea abies*.

1855. BOGORAD, L. **Effects of streptomycin on chlorophyll formation in dark-grown seedlings.** *Abstr.* in *Amer. J. Bot.* 37 (8), 1950 (676). O.B.D.

Seeds of *Pinus jeffreyi* were germinated in darkness on agar media containing various concentrations of streptomycin. At a concentration of 0·2% streptomycin the cotyledons of almost all of the seedlings developed without chlorophyll. These cotyledons, after being separated from their megagametophytes and from the remainder of the seedling, failed to form chlorophyll in the dark when subsequently grown in contact with megagametophytes from seeds germinated on a streptomycin-free medium. Similarly isolated cotyledons, however, formed chlorophyll when they were grown in the light after separation. Several other treatments, including exposure to light on a substrate containing 0·2% streptomycin, were tried, but under none of these conditions was chlorophyll formed by the cotyledons. Cotyledons of seeds germinated on a streptomycin-free medium formed chlorophyll in darkness but failed to form additional chlorophyll in darkness when grown on a 0·2% streptomycin medium after separation from the megagametophytes.

1856. SCHOU, L. **On chlorophyll formation in the dark in excised embryos of *Pinus jeffreyi*.** *Physiol. Plant., Copenhagen* 4 (4), 1951 (617–20). 8 refs. [E.e.]

It was found that the presence of 5% glucose or sucrose in the medium on which the embryos were grown caused a slight formation of chlorophyll to take place, which did not happen on a medium containing only inorganic nutrients. The results seem to indicate that the utilization of soluble sugars is in some way connected with chlorophyll synthesis in conifer seedlings in the dark.

1857. MEHROTRA, B. S. **Physiological studies of some *Phytophthora*. III. Carbon requirements.** *Lloydia* 14 (2), 1951 (122–8). 16 refs. P.R.

1858. FRIES, N. **Effect of certain nucleic acid constituents on the growth of some higher fungi.** *Nature, Lond.* 168 (4285), 1951 (1045–6). 6 refs. [Institute of Physiological Botany, University of Uppsala.]

The effect of adenine was studied on a number of species of wood- and litter-inhabiting Hymenomycetes growing in liquid culture. A strong positive response was obtained from *Polyporus abietinus*, *P. annosus* and several species of *Mycena*. It is suggested that these responses are due to deficiencies in the biosynthesis of purines in the fungi in question.

1859. WAREING, P. F. **Growth studies in woody species IV. The initiation of cambial activity in ring-porous species.** *Physiol. Plant., Copenhagen* 4 (3), 1951 (546–62). 22 refs. [E.e.]

[Cf. *For. Abstr.* 13 (No. 136).]

When trees of the ring-porous species *Fraxinus excelsior*, *Quercus robur*, *Robinia pseudoacacia*, and *Castanea sativa* are debudded, abundant wide vessels are found throughout the trunk, and are more numerous at the base than in the apical portions. Debudded trees of the diffuse-porous species *Acer pseudoplatanus* and *Tilia europaea* show no cambial activity, except for a short distance below strong adventitious buds. By means of 'ringing' experiments and observations on the origin of the vessels, it is shown that the cambial stimulus in debudded ring-porous trees arises from adventitious buds, and that vessels are developed at a very early stage of development of these buds. The difference between ring-porous and diffuse-porous species in their response to debudding is due to the fact that a small amount of bud growth leads to the stimulation of vessel development over considerable distances in ring-porous species, whereas in debudded diffuse-porous species the cambial activity stimulated by the early development of the buds is very slight. These conclusions agree with observations on the differences between the two types of species with respect to cambial initiation under normal conditions. It is suggested that the characteristic pattern of cambial initiation in ring-porous species is due to the presence in the cambium of a reserve of auxin-precursor, which makes possible the rapid spread of wide-vessel formation throughout the tree, at an early stage of development of the buds. *Author's summary.*

1860. RASKATOV, P. B. **O priroste drevesiny za vegetacionnyi period. [Growth of the xylem during the vegetative period.]** *Priroda, Moskva* 40 (7), 1951 (63–5). 2 refs. [Russ.] A.P.B.

At intervals of 10–14 days throughout the growing season of 1945, the author measured the diameter increment of 5 trees each, 50–90 years old, of two

forms of Oak (early and late flushing [*Quercus robur*?]), and of *Fraxinus excelsior*, *Ulmus* sp., *Tilia* sp., *Acer platanoides*, *Alnus glutinosa*, *Pinus sylvestris*, *Betula verrucosa* and *Populus tremula*, growing in natural stands in the Voronezh State Forest Reserve. Samples were taken 1–2 m. above ground level with a special chisel and immediately measured under the microscope. Results are tabulated. Over 50% of the species began to grow only in the first 10 days of June. Species which started late were usually also late in finishing growth. No species showed growth after 20 September, and some—e.g. Ash, Elm—finished their growth in the second half of August. The species that made relatively narrow rings (both forms of Oak, Ash, Elm, Maple, Birch and Alder) formed ca. ¼ of the ring in the first half of the period of cambial activity, whereas those forming wide rings (Aspen, Pine, Lime) formed only slightly more than ½ of their ring width during this period.

163. *Embryology*

See Nos. 1855–6.

164. *Morphology*

See also Nos. 1851, 1895, 1905.

1861. CAMEFORT, H. Structure du point végétatif de *Ginkgo biloba* en periode d'activité (initiation foliaire). [**The structure of the growing point of *Ginkgo biloba* in the active period (leaf initiation).**] *C. R. Acad. Sci., Paris* 233 (1), 1951 (88–90). [F.] O.R.S.

1862. GIFFORD, E. M. JR. **The structure and development of the shoot apex in certain woody Ranales.** *Amer. J. Bot.* 37 (8), 1950 (595–611). 66 refs. O.B.D.

1863. WYLIE, R. B. **Principles of foliar organization shown by sun-shade leaves from ten species of deciduous dicotyledonous trees.** *Amer. J. Bot.* 38 (5), 1951 (355–61). 6 refs. O.B.D.

The following species were studied: *Acer saccharum*, *A. platanoides*, *Catalpa speciosa*, *Fraxinus americana*, *Liquidambar styraciflua*, *Lonicera tatarica*, *Prunus serotina*, *Quercus macrocarpa*, *Q. velutina* and *Ulmus americana*.

1864. TERASMÄE, J. **On the pollen morphology of *Betula nana*.** *Svensk. bot. Tidskr.* 45 (2), 1951 (358–61). 2 refs. [E.] O.B.D.

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 1896, 1916–7, 1920–1, 1934, 1951, 2036, 2038–42, 2708.

1865. ***Zeitschrift für Forstgenetik und Forstpflanzenzüchtung.*** J. D. Sauerländer's Verlag, Frankfurt am Main. Quarterly. Price *DM.*22 p.a.

Vol. 1, No. 1, 1951, contains 32 pages all in German. Abbreviation in *For. Abstr.*: *Z. Forstgenet.*

1866. WETTSTEIN, W. Forstliche Züchtung, ihre Bedeutung für den Sortenausgleich der Holzbilanz Österreichs und seiner Nachbarstaaten. [**Forest tree breeding, its significance for adjusting [the contribution] of [the various] species to the timber balance of Austria and her neighbour states.**] *Schr-Reihe öst. Ges. Holzforsch.* No. 2, 1950 (32–41). [G.] P.R.

With chief reference to the value of fast growing Poplars.

1867. WRIGHT, J. W. **Tree-breeding technique: some effects of continuous bagging.** *Ntheast. Res. Note Ntheast For. Exp. Sta.* No. 5, 1951. pp. 4.

In tree-breeding trials during 1947–50, some of the bags used to protect the flowers were not removed as usual after 2–3 weeks but were accidentally left on until seed maturity. There were some harmful effects: branches of *Acer platanoides*, *A. negundo* and some Oaks, died early in the next summer; and seed yields from *Fraxinus pennsylvanica* var. *lanceolata* and *Liriodendron tulipifera* were lowered. However, seed yields from some trees of *Betula maximowicziana*, and Pines, especially *P. strobus* and *P. densiflora*, were very much above average. In some fairly large-scale field trials in 1948, bags were left on some spring-fruiting Red Maple; there was no difference in the seed set, but continuously bagged seeds matured a few days earlier and germinated earlier. Continuous bagging is considered a satisfactory procedure for this species, saving time and producing satisfactory seed yields.

1868. SEITZ, F. W. Chromosomenzahlenverhältnisse bei Holzpflanzen. [**The chromosome numbers of woody species.**] *Z. Forstgenet.* 1 (1), 1951 (22–32). 156 refs. [G.]

A general discussion with a list showing chromosome numbers of tree and shrub species (chiefly of the temperate zone) arranged under genus and family.

1869. TISCHLER, G. Die Chromosomenzahlen der Gefässpflanzen Mitteleuropas. [**The chromosome numbers of vascular plants of central Europe.**] Dr. W. Junk, 's-Gravenhage. 1950. pp. 263. Numerous refs. [G.] O.B.D.

1870. GOETZ. Streifzug durch das schlesische Fichtengebiet. [**Trip through the Silesian Spruce region.**] *Forst u. Holz* 6 (23), 1951 (341–4). [G.]

Notes on the characteristics of various forms of Spruce found in both the mountainous and the lowland regions of Silesia.

1871. NORDMARK, O. Om talltypens variation i Sydsverige. [**Variation in Pine in southern Sweden.**] *Svenska SkogsvFören. Tidskr.* 48 (4), 1950 (406–9). 9 refs. [Sw.]

The best types of Pine, with straight stems, narrow crowns and a high proportion of heartwood, are found in the east of the region, and the poorer types increase towards the west with the increasing rainfall, heavier soils, and greater competition from weeds and from Spruce.

1872. CAMP, W. H. **A biogeographic and paragenetic analysis of the American Beech (*Fagus*).** *Yearbook, American Philosophical Society, Philadelphia 1950*, 1951 (166–9). L.S.

Distinguishes 3 basic types of Beech in eastern North America, viz. 'White', 'Red' and 'Gray', and outlines their distribution. The Beech of the Beech/Maple climax forest of this region is made up of

genic elements of the 3 basic types. It forms part of the climax, not because Beech is fundamentally adapted to the region, but because, owing to its genetic make-up and physiology, it is adapted to a wide variety of habitats. The probable evolution of the Beech population of the Ohio Valley/Great Lakes deciduous forests is briefly discussed.

1873. ROBAK, H. Proveniensproblemet og vekstforedling av skogstrær. [**The problem of provenance and tree breeding.**] *Tidsskr. Skogbr.* 58 (9), 1950 (236–40). [Nor.]

Concludes that although frost-resistant individuals may be found among material from the optimum zone of a southern provenance (the examples quoted are from trials in Norway and Denmark of Sitka Spruce, Douglas Fir and Hemlock from the state of Washington), these should not be used for tree-breeding unless they are superior in vigour to plus trees of more northern provenance, known to be frost-resistant.

1874. GUERREIRO, M. GOMES. Para um melhor aproveitamento das formas culturais de interêsse económico de castanheiro. [**The improvement of cultivated forms of economically valuable Chestnut.**] *Publ. Serv. flor. aqüic. Portugal* 13 (1/2), 1946 (5–17). [Port.e.]

Discusses and describes strains of Chestnut to be found in the three most important regions of Portugal, i.e. those centred in Vinhais, Carrazedo de Montenegro and Moimenta da Beira. [Cf. *For. Abstr.* 13 (No. 2259).]

1875. PRYOR, L. D. **Controlled pollination of *Eucalyptus*.** *Proc. Linn. Soc. N.S.W.* 76 (3/4), 1951 (135–9 + 1 photo). 5 refs. D.S.I.R.

Successful cross-pollination in several pairs of *Eucalyptus* species and the methods employed are recorded. Self-fertility has been found in all species examined, but possibly some self-sterile individuals exist. Attempts at wide crossing were unsuccessful. *Author's summary.*

1876. PRYOR, L. D. **A genetic analysis of some *Eucalyptus* species.** *Proc. Linn. Soc. N.S.W.* 76 (3/4), 1951 (140–8 + 5 photos). 5 refs. D.S.I.R.

Genetic analysis by progeny testing, based principally on morphological seedling characters, has revealed probable F_1 hybrids, and segregating swarms between several species. There is at present no evidence of hybridization between certain major taxonomic groups of the genus. *Author's summary.*

168. *Histology*

See also Nos. 1851, 2397 *et seq.*

1877. GAUTHERET, R. J. Remarques sur les besoins nutritifs des cultures de tissues de *Salix caprea*. [**Notes on the nutritive requirements of tissue cultures of *S. caprea*.**] *Comptes Rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 144 (3/4), 1950 (173–4). 6 refs. [F.] O.R.S.

Tissues of *S. caprea* grown on a medium containing mineral salts, gelose, glucose, and traces of vitamin B, cysteine, indoleacetic acid, pantothenic acid and biotin, continued to proliferate after 47 months and 23 transplantings. After 2 years, tissues were transplanted on to media containing r growth substances and continued to grow although the rate of proliferation was reduced.

1878. KULESCHA, Z. Recherches sur l'élaboration des substances de croissance par les cultures de tissues de quelques végétaux. [**Research on the elaboration of growth substances by tissue cultures of some plants.**] *Comptes Rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 144 (3 4), 1950 (179–81). 6 refs. [F.] O.R.S.

In tissues of *Crataegus monogyna* and *Parthenocissus tricuspidata* grown on media containing only mineral salts and glucose, the original content of growth substances progressively decreased. In tissues of *Salix caprea*, however, it remained constant.

17. SYSTEMATIC BOTANY

See also No. 1812.

172.8. Eumycetes (True Fungi)

See also Nos. 2253 *et seq.*, 2555–7.

1879. VANTERPOOL, T. C., and MACRAE, R. **Notes on the Canadian tuckahoe, its occurrence in Canada and the interfertility of its perfect stage, *Polyporus tuberaster* Jacq. ex Fries.** *Repr.* from *Canad. J. Bot.* 29, 1951 (147–57). 14 refs.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

See also No. 1985.

1880. BEAN, W. J. **Trees and shrubs hardy in the British Isles. Vol. II. F–Q, Vol. III. R–Z.** John Murray, London. 7th ed. (rev.), 1951. pp. 664 + 636 + 93 photos. Price £4. 4*s*. the two volumes. Cf. *For. Abstr.* 12 (No. 182).

1881. TÄCKHOLM, V., and DRAR, M. **Flora of Egypt. Vol. 2. Angiospermae, part Monocotyledones: Cyperaceae-Juncaceae.** *Bulletin of the Faculty of Science, Fouad 1 University, Cairo* No. 28, 1950. pp. 547. Many refs.

Includes a section on Palmae (pp. 164–355), covering both indigenous and exotic Palms. The index to vernacular names is printed in both English and Arabic.

1882. CHEVALIER, A. Plantes remarquables observées en Afrique équatoriale à l'état vivant au cours d'un voyage en 1950–1951. II. [**Some remarkable plants seen on a journey through equatorial Africa in 1950–1.**] *Rev. int. Bot. appl. Agric. trop.* 31 (345/346), 1951 (384–90). [F.] P.R.

Includes descriptions and notes on the uses of: *Millettia laurentii, M. versicolor, Dalbergia boehmii, Bersama magnifica* sp. nov., *Nzidora leguevliana* gen. et. sp. nov., *Cola gigantea*, and *Cordia macrothyrsa* sp. nov.

1883. EXELL, A. W., and MENDONÇA, F. A. Conspectus florae angolensis. Vol. 1, Fasc. II. Malvaceae—Aquifoliaceae. [**Conspectus florae angolensis. Vol. 1, Fasc. II. Malvaceae—Aquifoliaceae.**] Ministério do Ultramar, Junta de Investigações Coloniais, Lisboa. 1951. pp. 177–422 + 17 plates + 1 map. [Port.] Price *Esc.*200.

Vol. 1, Fasc. 1: Ranunculaceae—Malvaceae, was published in 1937.

1884. MAIRE, R., and MONOD, T. Études sur la flore et la végétation du Tibesti. [Studies in the flora and vegetation of Tibesti, French Equatorial Africa.] *Mém. Inst. franç. Afr. noire* No. 8, 1950. pp. 140 + 12 drawings, 6 tbls. [F.]

1885. MENDONÇA, F. A. [Editor]. Contribuições para o conhecimento da flora de Moçambique. [Contribution to the flora of Mozambique.] *Estudos, Ensaios e Documentos, Ministério das Colónias, Lisboa* No. 1, 1950. pp. viii + 83, Numerous refs. [Port.]

1886. PARDY, A. A. Notes on indigenous trees and shrubs of S. Rhodesia. *Rhod. agric. J.* 48 (3; 4), 1951 (261–6 + 4 plates; 312–22 + 12 plates). (*Bull. Minist. Agric. Lds., S. Rhod.* Nos. 1580–2; 1587–92).

The first instalment is a general introduction to this series; the remainder give common names, general descriptions, distribution and uses of each of the following: *Parinari mobola, Uapaca kirkiana, Erythrina abyssinica, Isoberlinia globiflora, Dichrostachys glomerata, Bolusanthus speciosus, Protea abyssinica,* and *Pterocarpus angolensis.*

1887. [ACOSTA SOLIS, M.] Primera lista numerada de las maderas y leñosas del Ecuador colectadas por el Prof. Dr. M. Acosta Solis. [First numbered list of timbers and woody species of Ecuador collected by Prof. Dr. M. Acosta Solis.] *Flora, Quito* 7 (17/20), 1950 (7–77 + 12 drawings). [Span.E.]

The list is arranged according to regions and gives local names, specific names and families.

1888. HILDEBRAND, F. H. Boomnamenlijst van de Noord-Molukken. [List of tree species collected in the North Moluccas.] *Rapp. Bosbouwproefsta., Bogor* No. 45, 1951. pp. 53. [Jav.Du.E.]

The list is in two parts, arranged (1) by vernacular name, and (2) under family, genus and species. Each part shows vernacular name, its language or dialect, scientific name, and durability class of the wood. [Cf. *For. Abstr.* 13 (No. 103).]

1889. HILDEBRAND, F. H. Boomnamenlijst van de Zuid-Molukken. [List of tree species collected in the S. Moluccas.] *Rapp. Bosbouwproefsta., Bogor* No. 49, 1951. pp. 59. [Jav.Du.E.]

The list is in two parts, arranged (1) by vernacular names and (2) by family, genus and species. Each gives vernacular name, its language or dialect, scientific name and durability class of the wood.

1890. HILDEBRAND, F. H. Verbeterde boomnamenlijst van Java en Madura met aantekeningen over de verspreiding en afmetingen. [Revised list of trees of Java and Madura with information on distribution and dimensions.] *Rapp. Bosbouwproefsta., Bogor* No. 50, 1951. pp. 183. [Jav.Du.E.]

Lists 1,265 species under family and genus, giving vernacular and commercial names, maximum height and diameter measurements, notes on distribution and uses, and information on specific gravity, strength and durability. The notes are in Javanese, but there is a list giving Dutch and English equivalents of the main terms used. There is an index of vernacular names.

1891. GOMES, R. C. V. MONTEIRO. Explorações botânicas em Timor. [Botanical expeditions in Timor.] *Estudos, Ensaios e Documentos, Ministério das Colónias, Lisboa* No. 4, 1950. pp. 64 + 14 plates. 13 refs. [Port.f.e.g.]

A chronological account, starting with Dampier (1699–1700).

174.2. Gymnosperms

See also Nos. 1957, 2400–2.

1892. KOSSENAKIS, G. Hē Hellēnikē elatē. [The Greek [species of] *Abies*.] *Dasos* No. 1, 1947 (25–54). [Gk.]

An account, illustrated and in considerable detail, of *A. cephalonica*, its hybrids and varieties, distribution and extent in Greece, morphology, physiology (light, temperature, moisture and soil requirements), coppicing and reproductive powers, and some data on height growth.

1893. DOORENBOS, J. De soorten van het geslacht *Picea*. [The species of the genus *Picea*.] *Jaarb. ned. dendrol. Ver. 1948/49*, 17 [1950?] (25–53 + 2 plates). 22 refs. [Du.e.] [Laboratorium voor Plantensystematiek, Wageningen.]

A review of information not previously accessible in Dutch literature, with a key to, and notes on the nomenclature, description, distribution and history of, the 25 species grown in Holland. A new subdivision of the genus into 4 sections is proposed.

1894. HARRISON, S. G. *Pinus caribaea* (Slash Pine). *Kew Bull.* 1951 (2), (297–300). 16 refs.

Notes on the tree, its characteristics and its exploitation for resin.

1895. BUCHHOLZ, J. T. A flat-leaved Pine from Annam, Indo-China. *Amer. J. Bot.* 38 (4), 1951 (245–52). 10 refs. O.B.D.

Illustrates and describes the morphology of a branch bearing very unusual flat leaves, provisionally referred to *Pinus krempfii* var. *poilanei*. The anatomy of the leaf is described and compared with previous descriptions of the leaves of *P. krempfii* and other Pines. The anatomy of the brachyblastic branch is also described in greater detail. Two important differences between this species and other *Pinus* spp. are the presence of xylem parenchyma, and the absence of ray tracheids and horizontal resin canals. The bearing of the morphological and anatomical structures observed on the taxonomic status of *P. krempfii* are discussed. Both leaf and wood anatomy support the contention that this Pine belongs to a separate genus *Ducampopinus*; but the evidence is not considered conclusive, since the wood anatomy was studied from a very small sample. *From author's summary.*

1896. DELEVOY, G. À propos de la systématique de *Pinus nigra* Arnold. [The taxonomy of *P. nigra*.] *Trav. Sta. Rech. Groenendaal* (*Sér. B*) No. 12, 1949. pp. 38 + 12 dgms. 80 refs. [F.f.flem.]

After reviewing the literature and describing his own study of the morphology and anatomy of a number of types cultivated in France and Belgium, the author concludes that *P. nigra* should be divided into two subspecies, '*occidentalis*' and '*orientalis*', and that each of them includes as many varieties or

geographical races as there are natural habitats. (Cf. *For. Abstr.* 11 (No. 2534); 13 (Nos. 2039–41).]

1897. CHANEY, R. W. **A revision of fossil *Sequoia* and *Taxodium* in western North America based on the recent discovery of *Metasequoia*.** *Transactions of the American Philosophical Society, Philadelphia* (*n.s.*) 40 (3), 1950 (171–239 + 12 plates). Numerous refs. L.S.

175.2. Monocotyledons

1898. HAWKES, A. D. **Studies in Antillean botany. 1. A check-list of the Palms of Cuba.** *Phytologia* 3 (4), 1949 (145–9). A.P.B.

176.1. Dicotyledons

See also Nos. 2403–7.

1899. MEIKLE, R. D. **A new name for a common African *Rhus*.** *Kew Bull.* 1951 (2), (290–3).

Two common African *Rhus* species are often wrongly identified as *R. incana* or *R. villosa*. One of these is *R. longipes*; the other is described here as a new species, *R. vulgaris*.

1900. PICHON, M. Classification des Apocynacées: XIII, Genre *Wrightia* et genres voisins. [**The classification of the Apocynaceae: XIII, the genus *Wrightia* and related genera.**] *Phanérogamie* 14 (2), 1951 (77–91). 10 refs. [F.] O.B.D.

1901. BLAKELOCK, R. A. **A synopsis of the genus *Euonymus* L.** *Kew Bull.* 1951 (2), (210–90). Numerous refs.

Notes on taxonomy, distribution, phylogeny, seed dispersal and uses, with a key to the species, subspecies and varieties.

1902. BEIJERINCK, W. Het geslacht *Corylus* L. naar verwantschap en verspreiding der soorten en vormen. [**Systematics and distribution of the genus *Corylus*, its species and forms.**] *Jaarb. ned. dendrol. Ver. 1948/49* 17, [1950?] (67–107 + 4 plates). 48 refs. [Du.e.]

Discusses the systematic position of the genus among the Betulales, describes and gives a key to the 20 species recognized, with maps showing the distribution of 14 of them, and classifies the horticultural forms under 19 names, giving descriptions and horticultural synonyms in various languages.

1903. CHEVALIER, A. Euphorbes cactiformes de l'Oubangui-Chari et du Moyen Congo. [**Cactiform Euphorbias of Ubangi-Shari and the Middle Congo.**] *Rev. int. Bot. appl. Agric. trop.* 31 (345/346), 1951 (368–78). [F.] P.R.

Includes descriptions of 3 trees—*Euphorbia candelabrum*, *E. venenifica*, and *E. beillei*.

1904. ROGERS, D. J. **A revision of *Stillingia* in the New World.** *Ann. Mo. bot. Gdn.* 38 (3), 1951 (207–59).

Taxonomy and geographical distribution, with keys and an index of scientific names.

1905. GUERREIRO, M. GOMES, and RIBEIRO, J. PINTO. Acerca do valor da relação comprimento-largura da folha na caracterização de formas culturais de castanheiros. [**The value of the length-width ratio of leaves in distinguishing cultivated forms of Chestnut.**] *Publ. Serv. flor. aqüic. Portugal* 14 (1/2), 1947 (29–45 + 1 photo). 9 refs. [Port.e.]

Describes a method of measuring the length/width ratio of leaves of *Castanea sativa*. Allowing for a small deviation, it proved possible to identify different forms of Chestnut by this character.

1906. ROBYNS, W., and WILCZEK, R. Contribution à l'étude du genre *Beilschmiedia* de l'Afrique tropicale. [**A study of *Beilschmiedia* in tropical Africa.**] *Bull. Jard. bot. Brux.* 20 (2), 1950 (197–226). [F.] O.B.D.

Presents a key to the species and varieties and describes several new species.

1907. DUCKE, A. **The Aritú or Louro Aritú, a new species of timber tree from the Brazilian Amazon.** *Bull. Torrey bot. Cl.* 78 (4), 1951 (322–3). O.B.D.

A botanical description of *Licaria aritu* one of the most important timber trees of the 'Louro' group.

1908. TROUPIN, G. Contribution à l'étude systématique de *Berlinia* Soland. et genres voisins (Caesalpiniaceae-Amherstieae). [**Contribution to the systematic study of *Berlinia* and related genera.**] *Bull. Jard. bot. Brux.* 20 (2), 1950 (285–324). [F.] O.B.D.

1909. DUVIGNEAUD, P. Les *Berlinia* des forêts claires soudano-zambéziennes. [**The *Berlinia* of the open forests of the Sudan and the Zambesi regions.**] *Bulletin des Séances, Institut Royal Colonial Belge, Bruxelles* 21 (2), 1950 (427–38). [F.] L.S.

A study of the taxonomy of *Berlinia s.l.* and its geographical distribution in Africa. In the open forests of the Sudan and the Zambesi regions 3 genera of this group are distinguished, viz. *Berlinia*, *Isoberlinia* and *Pseudoberlinia*. In the Sudanese forests *Isoberlinia* is dominant, whereas the forests of the Zambesi region (which also include many species of *Isoberlinia*) are dominated by *Brachystegia*, *Pseudoberlinia* and (locally) *Berlinia*. This supports the theory of Aubréville, that the open forests of the Sudan and those of the Zambesi region were formed independently of one another. Those of the Sudan belong to the *Isoberlinietalia dokae*, whereas those of the Zambesi region belong to the *Pseudoberlinio-Brachystegietalia spiciformis*.

1910. LÉONARD, J. Notulae systematicae. IX. Nouvelles observations sur le genre *Guibourtia* (Caesalpiniaceae). [**Notulae systematicae. IX. New observations on *Guibourtia* (Caesalpiniaceae).**] *Bull. Jard. bot. Brux.* 20 (2), 1950 (269–84). [F.] O.B.D.

A taxonomic study presenting some new species and a key to the African species.

1911. LEWIS, N. **The Acacias of the Adelaide hills.** *South Australian Naturalist, Adelaide* 25 (2/4), 1950 (14–20). L.S.

A key to the *Acacia* spp. found in this region, with some illustrations.

1912. CAVACO, A., and NORMAND, D. *Morelodendron* (Linacées), genre nouveau de l'Ouest africain. [***Morelodendron*, a new genus of West Africa.**] *Bull. Soc. bot. France* 98 (4/6), 1951 (122–6). 5 refs. [F.] O.B.D.

This new monospecific genus of the Linaceae is found near Sangatanga in the Gabon estuary. A description is given of *M. gabonense*, a tree about 20 m. high, and of a variety of this species, *alombiense*.

1913. LÉONARD, J. Note systématique sur les parasoliers au Congo-Belge (*Musanga* et *Cecropia*—Moracées). [**Systematic note on the Parasoliers of the Belgian Congo (*Musanga* and *Cecropia*).**] *Bull. agric. Congo belge* 42 (4), 1951 (951–64). 15 refs. [F.flem.]

(1) Discusses the nomenclature of the only species of *Musanga* and concludes that the name *M. cecropioides* is prior to *M. smithii*. (2) Briefly discusses the ecology of the 'parasoleraie'. (3) Describes a species of *Cecropia* introduced into the Congo from Paraguay, which resembles *Musanga* in its habits and has replaced it in some areas, and concludes that it is *C. leucocoma*. This species is myrmecophilous in South America, but has not so far effected a symbiosis with any African ants.

1914. GOWDA, M. **The genus *Pittosporum* in the Sino-Indian region.** *J. Arnold Arbor.* 32 (3; 4), 1951 (263–301; 304–43).

1915. HAUMAN, L. Contribution à l'étude des Chrysobalanoideae africaines. [**A study of the African Chrysobalanoideae.**] *Bull. Jard. bot. Brux.* 21 (1/2), 1951 (167–98). 28 refs. [F.] O.B.D.

1916. GUINIER, P. Deux formes affines d'alisiers: *Sorbus latifolia* Pers. et *S. confusa* Gremli. [**Two related Whitebeams: *S. latifolia* and *S. confusa*.**] *Bull. Soc. bot. France* 98 (4/6), 1951 (86–8). 5 refs. [F.] O.B.D.

A comparative study of the two species leads to the conclusion that *S. latifolia* is of hybrid origin.

1917. POUCQUES, M.-L. DE. Étude chromosomique des *Sorbus latifolia* Pers. et *Sorbus confusa* Gremli. [**Study of the chromosomes of *S. latifolia* and *S. confusa*.**] *Bull. Soc. bot. France* 98 (4/6), 1951 (89–92). [F.] O.B.D.

Advances the theory that *S. confusa* is a hybrid resulting from pollination of *S. aria* by *S. torminalis*, and that *S. latifolia* is a hybrid from an inverse cross of the same two species.

1918. CHEVALIER, A. Un *Sarcocephalus* peu connu de l'Afrique centrale. [*S.* [***xanthoxylon***], **a little-known species of central Africa.**] *Rev. int. Bot. appl. Agric. trop.* 31 (347/348), 1951 (505–7). P.R.

A botanical description, with notes on distribution and on the uses of the bark in native medicine, and of the fruit as food.

1919. POURTET, J. **The Poplar—its place in the world.** *Unasylva* 5 (2), 1951 (55–9).

1920. ROL, R. Les peupliers et les principales essences forestières de l'est des États-Unis. Rapport de Mission Mai-Juin 1950. [**The Poplars and the principal forest tree species of the Eastern United States. Report on the** [O.E.E.C.] **Mission May-June 1950.**] *Ann. Éc. Eaux For. Nancy* 12 (2), 1951 (527–637 + 53 photos). 49 refs. [F.g.e.]

The main object of the mission was to study the Poplars in their natural habitats, and the fast growing artificial hybrids made by American breeders; the latter are reported on unfavourably.

1921. ROULEAU, E. Les *Populus* de la section *Tacamahacca* en Amérique. [***Populus* of the section *Tacamahacca* in America.**] *Annales de l'ACFAS, Montréal* 15, 1949 (106). [F.] L.S.

The section in America contains 3 species and 3 varieties. The species hybridize easily with those of the section *Aegeiros* and have produced 5 hybrids.

1922. WILCZEK, R. Revision des genres *Blighia* Koenig et *Phialodiscus* Radlk. [**Revision of the genera *Blighia* and *Phialodiscus*.**] *Bull. Jard. bot. Brux.* 21 (1/2), 1951 (149–65). 8 refs. [F.] O.B.D.

1923. SCHULTES, R. E. El género *Herrania* pariente silvestre del cacao cultivado. [**The genus *Herrania*, wild relation of the cultivated Cacao.**] *Agric. trop., Bogotá* 7 (7), 1951 (43–8). [Span.] A.P.B.

Notes on various species of *Herrania*.

1924. MERRILL, E. D. **On the identity of the genus *Baranda* Llanos.** *J. Arnold Arbor.* 32 (4), 1951 (409–11).

A review of the genus reveals that the generic name *Baranda* is a synonym of *Symplocos*, and *B. angatensis* Llanos a synonym of *S. polyandra* (Blanco) Brand.

1925. KOBUSKI, C. E. **Studies in the Theaceae, XXIV. The genus *Sladenia*.** *J. Arnold Arbor.* 32 (4), 1951 (403–8 + 1 plate).

A taxonomic study of the Asiatic genus *Sladenia* and of the type species *S. celastrifolia*.

18. PLANT ECOLOGY

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 1892, 1894, 2033, 2094, 2117, 2151–2.

1926. DREES, E. MEIJER. **Distribution, ecology and silvicultural possibilities of the trees and shrubs from the savanna-forest region in eastern Sumbawa and Timor (Lesser Sunda Islands).** *Commun. For. Res. Inst., Bogor* No. 33, 1951. pp. 146. 37 refs. [E.jav.du.]

A fairly complete list giving for each tree or shrub the scientific name, with synonyms; a brief description, including information on habit of growth, dimensions and fire resistance; area of distribution, notes on ecology, and comments on suitability, for timber production and for erosion control. [Cf. *For. Abstr* 13 (No. 1992).]

1927. BOOMSMA, C. D. **The Red Gum (*Eucalyptus camaldulensis* (Dehn.)) association of Australia.** *Aust. For.* 14 (2), 1951 (99–110 + 4 photos). 22 refs.

1928. NEUMANN. Die Roteiche. [***Quercus borealis*.**] *Forst u. Holz* 6 (20), 1951 (292–5). [G.]

Notes on ecological requirements and silvicultural characters.

181.1. Distribution, Natural Range

See also Nos. 1872, 1904, 1909, 1964, 1966.

1929. LITTLE, E. L., JR. **Mapping ranges of the trees of the United States.** *Rhodora* 53 (632), 1951 (195–203). 33 refs. O.B.D.

A summary of work to date.

1930. VASCONCELLOS, J. DE CARVALHO E. Sur la présence du genévrier cade dans la flore de la région 'Duriense'. [The presence of *Juniperus oxycedrus* subsp. *macrocarpa* in the flora of the 'Duriense' region.] *Repr.* from *Compte Rendu du 16e Congrès International de Géographie, Lisbonne 1949*, 1950 (867–70). [F.]

J. oxycedrus subsp. *macrocarpa* is the only conifer indigenous to the 'Duriense' region (i.e. that part of the Douro basin which extends from the Portuguese frontier to a little below Régoa) and is a relict of the pre-glacial vegetation. A brief account is presented of the plant associations of the areas in which the Juniper is commonly found.

1931. GUERREIRO, M. GOMES. Área do castanheiro e possibilidades da su expansão. [Area under Chestnut and possibilities of expanding it.] *Publ. Serv. flor. aqüic. Portugal* 14 (1/2), 1947 (47–67 + 3 plates). 22 refs. [Port.e.]

Ecological conditions affecting the distribution of *Castanea sativa* in Portugal are: non-calcareous soils rich in K, a mean annual temperature between 10° and 14° C., a mean annual rainfall of more than 800 mm., and altitudes between 500 and 1,000 m. Maps showing the actual and potential areas are presented. The author believes that it would be easy to increase the present area of 85,000 ha. to 250,000 without overstepping the boundaries of the potential growth area.

1932. REYNOLDS, W., and POTZGER, J. E. Distribution of *Quercus muehlenbergii* in Indiana. *Butler Univ. bot. Stud.* 10, Pap. No. 8, 1951 (71–9). 5 refs. A.P.B.

1933. ANDERSON, M. L. Distribution of the Sessile Oak in the New Forest, Hampshire. *Forestry* 24 (2), 1951 (79–113 + map). 9 refs.

The author gives the detailed results of a thorough examination of almost every part of the New Forest with the object of determining the present distribution of Sessile and Pedunculate Oaks in order to see how far it affected his hypothesis that Sessile Oak is, and Pedunculate Oak is not, a native of Great Britain. He found evidence that there was an almost unbroken massif of Sessile Oakwood in the northern high-lying part of the New Forest up to relatively recent historical times, and some evidence of the same having existed in the southern half which, being more accessible, was no doubt devastated earlier. The common mixture of Pedunculate Oak/Beech is not a normal natural association and the unhealthy condition of such woodlands confirms the view that the presence of both species in the New Forest is due to artificial introduction. Signs of soil degradation are evident on the infertile sites under both these species. Wherever vigorous seed-trees of Sessile Oak are available, this species is able to extend its range, even into stands of Pedunculate Oak and Beech, where Pedunculate Oak does not seem capable of establishing itself. Sessile Oak should be encouraged in future until it has recovered much of the ground lost to it by the planting of the other species. Pedunculate Oak and Beech should be confined to the very best sites, which are not of great extent. It is vitally important that the silvicultural differences between the two species of Oak should be better appreciated in the future than they have been in the past.

1934. KRAHL-URBAN, [J.] Trauben- und Stieleiche in Schweden. [Sessile and Pedunculate Oak in Sweden.] *Forstwiss. Cbl.* 70 (5), 1951 (319–36). 17 refs. [G.]

Part of a study of *Q. sessiliflora* and *Q. robur* on the borders of their natural range [cf. *For. Abstr.* 3 (296) and 6 (188)]. A study of these Oaks in Sweden shows clearly that low temperatures are the main factor in determining their northern limits. The boundary for *Q. sessiliflora* in Sweden largely coincides with the – 3° C. January mean temperature line. It also corresponds to a considerable degree with the + 5° C. isotherm of mean annual temperature. The northern limit of *Q. robur* corresponds roughly with a – 5° C. January mean temperature line. This runs somewhat north of the + 5° C. isotherm of mean yearly temperature. The greater susceptibility to cold of the former species is thus clearly demonstrated. The most northern stands are found only on the most favourable sites, mainly on alluvial soils. The northern limits of *Q. sessiliflora* and *Q. robur* correspond approximately to those of *Populus tremula*, *Fraxinus excelsior*, *Corylus avellana* and *Betula nana*. An unusual feature of the Oak is its soundness and thriftiness at its limit, where growth compares well with the normal of its natural range. Height growth in Sweden corresponds generally to Schwappach's yield classes II or III, and may be even better on favourable sites. It regenerates well in this region; fair seed years may be expected on an average every 6–8 years. Since no transitional forms were found in the northern zone, where *Q. robur* alone is found, the author suggests that natural hybridization is more common than is usually supposed. Notes are included on Swedish practices in management, creation of stands, and selective breeding of Oak.

1935. MØRKVED, K. L. Askeforekomster i Nord-Trøndelag. [Ash in North Trøndelag.] *Tidsskr. Skogbr.* 59 (4/5), 1951 (125–45). [Nor.]

Gives details (numbers and dimensions of trees, soil types and associated plants) of some of the Ash woods at the northern limit of the species in Norway, with particulars of some recent plantings in the same district, and notes from literature on soil and climatic requirements.

1936. S., E. E. Blæösp fundin á Austurlandi. [*Populus tremula* in eastern Iceland.] *Ársr. Skógræktarf. Íslands 1948* (123–4). [Ice.]

A number of young trees, the tallest ½ m. high, have been found in heavily grazed Birch scrub. This is the second record of *P. tremula* growing naturally in Iceland.

1937. ANAGNOSTOPOULOS, P. Hygrambaris hē Anatolikē. [*Liquidambar orientalis*.] *Dasos* No. 2/3, 1947 (18). [Gk.]

Includes a note on the occurrence of this species on the island of Rhodes, at Kalamai village only, which the author personally confirmed.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 1851, 1863, 1934, 1960, 2020, 2034, 2039–41.

1938. GIACOBBE, A. L'ecologia dell'abete bianco. Nota II. Ricerche storiche e geografiche sull'abete bianco. Nota III. Caratteri floristici e climatici dell'abete bianco. [**The ecology of *Abies alba* [in Italy]. Note II. Historical and geographical studies on the [distribution of] *A. alba*. Note III. Floristic and climatic characters of *Abies alba* stands.**] *Archivio botanico, Forlì* 26 (1; 2; 3/4), 1950 (1–20; 65–84; 129–49, 186–201). [It.it.e.] K.

From a study of the floristic composition and climatic factors of a number of Silver Fir stands, the author concludes that *A. alba* in Italy represents a mesoxerophilous and mesothermic type, distinct from the Central European type, and characteristic of the submontane and montane zones (upper zone of the *Quercetum mixtum* and lower zone of the *Fagetum*). Its climatic requirements correspond to the warm wet climate of the Tuscan Apennines during the catathermic oceanic period of the post-glacial age, when the greatest expansion of the *Abietum* occurred. *From author's summary.*

1939. IBBERSON, J. E., MICKALITIS, A. B., and KURTZ, S. **The Cedar of Lebanon . . . finds a new home in Pennsylvania.** *Pa. For. Wat.* 3 (5), 1951 (96–104).

A general account of the species, its acclimatization and methods of regeneration in Pennsylvania. Data on dimensions, age and vigour of a number of specimens are tabulated. [Cf. *For. Abstr.* 13 (No. 2037).]

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 1806, 1853, 1973, 2000, 2006, 2023, 2094, 2116, 2153, 2220–4, 2331–2, 2421–2.

1940. KRUPENIKOV, I. A. Tamariks i ego soleustoĭčivostj. [***Tamarix* and its salt resistance.**] *Priroda, Moskva* 40 (7), 1951 (65–6). 6 refs. [Russ.] A.P.B.

[Cf. *For. Abstr.* 13 (Nos. 329, 2176).] Emphasizes the value of Tamarisks for planting on chestnut earths, saline and sandy soils of the steppe and semi-desert regions of the U.S.S.R. *Tamarix gracilis* tolerates both Cl' and SO_4'' ions; the mean salt content of its rooting zone in its natural habitats is 1·59–2·16%, the maximum Cl' and SO_4'' contents being respectively 1·766% and 1·399% [cf. *For. Abstr.* 12 (No. 96)]. It is also highly drought-resistant, and, in common with some other *Tamarix* species, will withstand periodic flooding and snow-falls up to 70–80 cm. deep. Another salt-resistant species is *T. karelinii*. Of other species occurring in N.W. Kazakhstan, *T. laxa* and *T. ramosissima* occur on less saline soils, the latter species especially on those of light texture.

1941. NAVALKAR, B. S., and BHARUCHA, F. R. **Studies in the ecology of Mangroves. VI. Exchangeable bases of Mangrove soils.** *Journal of the University of Bombay* (*n.s.*) 18*B* (5), 1950 (7–16). 7 refs. L.S.

Samples of Mangrove soils at different depths and from different localities were analysed for exchangeable Ca, Mg, K and Na contents, and the results are given in tables and diagrams. No important part in determining vegetation appears to be played by $CaCO_3$ content, humus or pH; the main factor appears to be the relative amounts of exchangeable bases present in the soil. Three types of soil are distinguished: (1) Ca/Mg soils, which are dominated by *Avicennia alba*, (2) Ca/Na soils, characterized by *Acanthus ilicifolius*, and (3) Ca/K soils, characterized by *Suaeda fruticosa* and associated plants. [Cf. *For. Abstr.* 12 (No. 2651); 13 (No. 1971).]

1942. JONES, W. N., and LEVISOHN, I. **Acid tolerance in plants.** *Nature, Lond.* 168 (4279), 1951 (791–2).

Seed of *Pinus halepensis*, Ash, and other tree species usually associated in nature with alkaline soils, were sown in pots and in the field (1) in acid soil of Wareham Heath (pH 4–4·5), and (2) in the same soil to which had been added compost with an acid reaction so that the pH of the soil remained virtually unaltered after the addition of compost. Growth in (1) was extremely poor, whereas in (2) it was excellent though the reaction of the rooting medium was little more than pH 4. Similar results were obtained with clovers, buckwheat, lucerne, and wheat. The results indicate that the direct limiting factor for growth is not the low pH of the soil.

1943. STONE, E. L., JR. **Some effects of mycorrhizae on the phosphorus nutrition of Monterey Pine seedlings.** *Proc. Soil Sci. Soc. Amer. 1949*, 14, 1950 (340–5). 15 refs. L.S.

Pot-culture studies with *Pinus radiata* grown in a synthetic soil containing ground phosphatic minerals, failed to demonstrate any effect of mycorrhizae on P uptake by the seedlings. Similar cultures of Pine on O'Neill sandy loam and Carrington silt loam showed that mycorrhizal infection was followed by accumulation of P by the plant and resumption of normal growth. Non-mycorrhizal seedlings failed to accumulate any considerable quantity of P from untreated (i.e. without additional P) soils, but, on the Carrington soil, grew satisfactorily when P fertilizers were supplied. It is concluded that at least much of the mycorrhizal response in Pine can be attributed to improved P nutrition. *From author's summary.*

1944. **The study of mycorrhiza.** *Sunm. Rep. Israel Dep. For. 1950/51*, 1951 (4–5).

In natural stands and regeneration of Aleppo Pine most of the rootlets of both mature and young trees were found to show well defined systems of normal ectotrophic mycorrhizae. The occurrence of mycorrhizae on *Quercus ithaburensis* and *Q. calliprinos* was different in two localities: in one, roots of *Q. ithaburensis* showed normal ectotrophic mycorrhizal associations, whereas those of *Q. calliprinos* had no trace of mycorrhizal infection; and in the other the position was reversed. In Pine plantations differences in mycorrhizal infection were found to be connected with differences in site factors, particularly aspect and depth of soil. Examination of *Pinus pinea* from two adjoining slopes showed that trees of

superior height growing in deep soil had no trace of mycorrhizae, while trees with better general health growing in shallow soil had strong mycorrhizal associations.

1945. NORKRANS, B. **Studies in growth and cellulolytic enzymes of *Tricholoma*, with special reference to mycorrhiza formation.** *Symbolae Botanicae Upsalienses, Uppsala* 11 (1), 1950. pp. 126 + 2 plates. Numerous refs. [E.e.]

The object of the investigations was to compare the physiology of two different fungus types, viz. litter decomposers, and formers of ectotrophic and ectendotrophic mycorrhizae with forest trees. For this purpose the comprehensive genus *Tricholoma*, which contains species representative of both types, was chosen. Aspects studied were: growth conditions, ability to decompose cellulose and soluble carbohydrates (with quantitative determinations of cellulose and related compounds decomposed), the physiological properties of mycorrhiza- and non-mycorrhiza-forming fungi, and cellulolytic decomposition by cell-free enzymic solutions of *Tricholoma*. [Cf. *For. Abstr.* 11 (No. 2479); 12 (No. 396).]

1946. WRIGHT, J. O. **Unusual features of the root system of the Oil Palm [*Elaeis guineensis*] in West Africa.** *Nature, Lond.* 168 (4278), 1951 (748). [Research Dept., Pamol Ltd., Sapele, Nigeria.]

1947. **Root studies.** *Rep. Intermt. For. Range Exp. Sta. 1950*, 1951 (44–5).

Hydraulically excavated root systems of a 17-in. d.b.h. Ponderosa Pine and of a typical open-growing *Ceanothus velutinus* are described.

181.4. Reaction to Biotic Influences and Fire

See also Nos. 1955, 1957–8.

1948. BRAATHE, P. **Granas veksthemning på lyngmark. [Check to growth of Spruce on *Calluna* sites.]** *Tidsskr. Skogbr.* 58 (3), 1950 (42–5). [Nor.]

The checking of Spruce of the first and sometimes of the second crop on sites having abundant heather is discussed. In 1948 and 1949, 2 series of 2-year-old Spruce plants (20 in all) were grown in zinc containers under cover, so that no rainfall could reach them. During both summers, group B was watered with tap water and group A with tap water in which heather plants, cut small, had been soaked for ½–1 hr. During summer 1948 there was no significant difference between groups A and B; the average length of the top shoot in group A was 3·25 and in group B 3·55 cm. By the late summer of 1949, however, the plants in group A were beginning to lose colour, and by late autumn became yellowish while those in group B remained green and healthy. Average top-shoot lengths were 5·10 and 6·35 cm. respectively. The pH value of the pure and heather-soaked water was measured. On 18 June '49 the figures were 6·3 and 4·7 and on 22 August '49 6·15 and 5·20 respectively. [Cf. *For. Abstr.* 12 (Nos. 2630–2).]

1949. TORKILDSEN, G. B. **Om årsakene til granens dårlige gjenvekst i einstapebestand. [The cause of poor reproduction of Spruce in stands with an undergrowth of bracken.]** *Blyttia, Oslo* 8 (4), 1950 (160–4). [Nor.e.] L.S.

Roots of bracken were dried, ground, and extracted with cold distilled water; the extract was then sterilized by filtration through a bacterial filter. In the first series of tests, Spruce seeds placed in the extract were slower in germinating than those in distilled water. Roots of seedlings in the extract averaged only 8·8 mm. in length after 11 days, while those in the control were 18·2 mm. long. Roots affected by the extract had a dark-brown thickening at the point, and a cross-section showed cell multiplication. The deformation was similar to that formed in roots treated with hormone preparations. In the second series, normal seedlings 11 days old were transplanted to sterile sand in Erlenmeyer flasks and watered during 15 months with a nutritive solution made with either water or extract. All the plants watered with the extract died or were dwarfed, while the controls developed normally. In the third series, 3-year-old plants grown in wooden cases and watered for more than a year with extract developed similarly to plants treated with ordinary water.

1950. BRUCE, D. **Fire resistance of Longleaf Pine seedlings.** *J. For.* 49 (10), 1951 (739–40).

Fire resistance of 1-year Longleaf Pine seedlings was found to be closely related to vigour classes (all vigorous seedlings and 75% of those in fair vigour, but none of the weak seedlings, survived). Vigour classes in turn were fairly closely related to ground-line diameter. The older the seedlings were at the time of the fire, the better they survived: survival at 9 months was less than 10%, at 16 months 30%, and at 26 months 40%. The better survival of seedlings first burned at 2 years of age is probably due to their greater thickness (0·2–0·4 in. diameter compared with 0·1–0·2 in. for yearlings).

181.5. Reproductive Behaviour

See also Nos. 1867, 1950, 1972, 1984, 2048, 2059.

1951. POLUNIN, N. **Arctic aerobiology: pollen grains and other spores observed on sticky slides exposed in 1947.** *Nature, Lond.* 168 (4278), 1951 (718–21). 10 refs.

The results are tabulated and discussed of 4 sorties flown in N.W. Territories and northern Alberta in 1947. They confirm the presence of pollen grains and the spores of Pteridophyta and pathogenic fungi in the air above remote, treeless, and even ice-bound regions northwards at least beyond the 70th parallel of north latitude. The northernmost catch of a winged pollen grain of a coniferous plant was made in latitude 69° 28′ N. Spores of various pathogenic fungi were found far north of their probable nearest point of origin (e.g. uredospores of stem rust of wheat at 70° 02′ N, which is nearly 1,000 miles from the nearest probable source). It is known that many pollens remain viable after almost a year's storage and that low temperatures, light-intensities and atmospheric pressure can favour pollen longevity. In these circumstances it seems conceivable that the possibilities of long-range hybridization may be greater in the Arctic than in some climatically more favourable regions where dense foliage etc. impedes take-up and effective

falling of 'pollen-rain', and much of the atmospheric pollen is removed by precipitation, and that this may be one of the factors behind the 'plasticity' of many groups of arctic plants, including the Salicaceae.

1952. KÜHLWEIN, H., and ANHAEUSSER, H. Veränderungen des Gymnospermenpollens durch Lagerung. [Changes in gymnosperm pollen brought about through storage.] *Planta* 39 (6), 1951 (476–9). 5 refs. [G.] O.B.D.

1953. SEREDIN, R. M. O vtoričnom cvetenii konskogo kaštana na Kavkazskih Mineraljnyh Vodah. [Second flowering of *Aesculus hippocastanum* in the Caucasian Mineral Waters region.] *Priroda, Moskva* 40 (8), 1951 (45–6). 3 refs. [Russ.] A.P.B.

In the towns of Pyatigorsk, Zheleznovodsk and Essentuki this species has flowered a second time each year since 1946, the phenomenon being especially marked in 1950, when 40% of the total number of trees in these towns flowered again between 15 August and 29 October. Disturbance of the normal rhythm of flowering is attributed to summer droughts, during which many of the normal flowers, young fruits and leaves may be dried up by hot winds, followed by rains beginning about mid-August.

1954. EASLEY, L. T., and CHAIKEN, L. E. An expendable seed trap. *J. For.* 49 (9), 1951 (652–3).

Instructions for making a seed-trap of corrugated paper at a cost of ca. $1.00, compared with $3.00 to $5.00 for the standard wire-screen traps. They will last for several seeding seasons if taken up and stored during the intervals.

1955. STONE, E. C., and JUHREN, G. The effect of fire on the germination of the seed of *Rhus ovata* Wats. *Amer. J. Bot.* 38 (5), 1951 (368–72). 7 refs. O.B.D.

Part of a study of fire-induced germination in chaparral seeds, undertaken in connexion with the establishment of brush cover on eroded slopes. In *Rhus ovata* high temperature is responsible for fire-induced germination, since it causes the impermeable second seed-coat layer to rupture, thus permitting water to enter through the third layer.

1956. ROHMEDER, E. Die Nachkommen einer 14jährigen und einer 170jährigen Fichte. [The progeny of a 14- and of a 170-year-old Spruce.] *Z. Forstgenet.* 1 (1), 1951 (19–21). [G.g.] [Institut für Forstsamenkunde und Pflanzenzüchtung, München.]

Seed collected from (*a*) a 14-year-old Spruce grown in a pot to induce premature fruiting, and (*b*) a 170-year-old Spruce above the average in height, were sown and the young plants, 234 from (*a*) and 144 from (*b*), compared. At the end of the 2nd growth year, the height of progeny from (*a*) averaged 41% above that of progeny from (*b*); by the 5th year the difference was reduced to 7% and by the 7th year it became negligible. Both trees gave strong, healthy progeny of normal form. In the 1947 and 1949 droughts, 94% of (*b*) and only 73% of (*a*) died.

1957. GOLUBINSKIĬ, S. S. Massovoe pojavlenie pobegov iz spjaščih poček u sosny obyknovennyĭ. [Mass appearance of shoots from dormant buds in [seedlings of] Scots Pine.] *Priroda, Moskva* 40 (9), 1951 (58–60). 2 refs. [Russ.] A.P.B.

Refers to the author's previous note on this phenomenon [see *For. Abstr.* 9 (No. 1856), where the author's initials should be corrected to S.S., and the year of publication, to 1945]. His transfer to the Lebyazhinsk district, Altai region, prevented him from following up the development of the stand described, but it has been reported as showing normal development. Having noted similar cases in the Lentochnye Bory, Lebyazhinsk, the author in 1943 tried the effect of cutting back ca. 2,500 three-year-old Scots Pine seedlings in April to leave a stump 0·2–2 cm. in height. After 3–4 weeks no fewer than 90% of these began to produce shoots from dormant buds. During later development 90–95% of the treated plants formed a new leader from one of the lateral shoots. From 1945 to 1949 their current height increment was equal to or even exceeded that of the controls. Height measurements for each year up to 1949 are tabulated. The author agrees with Sukačev's view that the Pine of W. Siberia represents a subspecies—*P. sylvestris* subsp. *kulundensis* Suk.

1958. VAARTAJA, O. On factors affecting the initial development of Pine. *Oikos* 2 (1), 1950 [1951] (89–108). 12 refs. [E.e.]

These experiments were made in 1946 on heathland in Finland (lat. 61° 40′ N. and 160 m. alt.) on the following plots: (1) bare area burnt in 1942; (2) mature Pine stand (15–20 m. high, crown projection 56%); (3) almost bare gap, 3 m. wide, in dense Pine regeneration on cut-over Pine stand; (4) gap, 5 m. wide, in stand similar to (3), but with 3 reserve Pines; (5) gravel-surfaced aerodrome; (6) sparse stand of Pine saplings; (7) treeless, low, hummocky heather. Half the area of plots 2, 6, and 7 was denuded of vegetation and raw humus before sowing (Plots 2a, 6a, 7a); part of plot 2 was surrounded by a trench to exclude root competition (Plot 2c). Half the area of each treatment was watered 6 times during dry periods in the summer of 1946. Seed was broadcast and left uncovered.

It was found that birds (mainly chaffinches) ate most of the seed on plot (2), and that ants (*Lasius* sp.) carried off most of that on plots (3) and (4). The ants also affected the thermal and moisture-holding contents of the soil because of their numerous tunnels in the surface layers.

The seedlings on all plots had mycorrhizae. Germination was higher and began earlier on denuded plots, but frost-heaving caused more damage on them than on those with vegetation and raw-humus cover. Best all-round results were obtained in a thin and broken cover of vegetation and raw humus. Development of seedlings was adversely affected by root competition (and probably also by interception) in plots (2) and (6).

In thin surface soils exposed to radiation, the maximum temperatures (measured in July) were often very high (40° to 69° C.) and the minimum temperatures very low (– 2° to 10° C.) [cf. *For.*

Abstr. 12 (No. 54)]. In these conditions, germination was much delayed and very young seedlings died during hot dry periods. Evaporation rate at a height of 1–4 cm. varied greatly on different sites but did not appear to be correlated with germination and seedling development. Watering everywhere had very beneficial results. It was observed that the water carried seed into protected holes, cracks, and such places nearer the mineral soil and also often caused sand or litter to cover the seed, with beneficial results. The same effects were observed in heavy rainfalls.

181.6. Life Form, Habit. Post-Seedling Development and Form. Crown Form and Crown Relations

See also Nos. 1989, 2089–90, 2330–4, 2411.

1959. **Growing space.** *Rep. Tenn. Vall. Auth. 1950/51*, 1951 (12).

Preliminary studies were made of the relationship between spacing and diameter growth of hardwoods. Measurement of 188 trees indicated that maximum diameter growth occurred when spacing in feet = D + 5, where D = d.b.h. in inches. Diameter growth generally remained constant at wider spacings, but slowed down at closer spacings.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

See No. 1956.

181.8. Phenology

See also Nos. 1849, 1859–60, 1953, 1984.

1960. OLMSTED, C. E. **Experiments on photoperiodism, dormancy, and leaf age and abscission in Sugar Maple.** *Bot. Gaz.* 112 (4), 1951 (365–93). 44 refs. O.B.D.

Length of photoperiod and amount of winter chilling were studied in relation to leaf senescence and abscission, onset and completion of bud rest, bud-break and amount of terminal growth in a seedling population of *Acer saccharum*. The results of the study, over a period of 7 years, indicate that the naturally decreasing photoperiod is the primary stimulus to leaf senescence (as judged by loss of green colour) and abscission. The effect of this stimulus is slightly affected by leaf age, the younger leaves being more slowly affected. Under natural conditions the breaking of dormancy (in Sugar Maple buds in deep rest) appears to be accomplished gradually as a consequence of adequate chilling, but in some plants it appears that inadequate or no chilling may be partially compensated for by long photoperiods. Duration and extent of terminal growth are related to photoperiod. The development of bud rest is a complex multi-conditioned process, not decisively controlled by photoperiod, though this may be a contributing factor.

1961. JARBOE, C. L., KEATING, R. E., and HOLCH, A. E. **Structural changes in four species of deciduous tree leaves during the period of leaf fall.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Boulder, Colo.* 4 (1), 1949 (47–8). L.S.

Both sun and shade leaves of *Ulmus americana*, *Populus occidentalis*, *Fraxinus lanceolata* and *Crataegus mollis* were studied, and the following conclusions drawn: There appear to be no visible structural changes in leaves during the period of leaf-fall, other than cell death. The % of thickness of the various tissues remains much the same during the period. There is no change in the total thickness of leaves during this period. Sun and shade leaves react similarly to the phenomenon of leaf-fall. In some cases a considerable number of living cells were found in leaf areas that appeared to be dead. Freezing temperatures do not appear to affect the internal conditions of the leaves in the late stages of leaf-fall.

182. *Synecology, Plant Sociology: General, Principles and Methods*

1962. DREES, E. M. **Verklarende lijst van termen uit de plantensociologie en synoecologie. [Explanatory list of terms used in plant sociology and synecology.]** *Rapp. Bosbouwproefsta., Bogor* No. 48, 1951. pp. 140. [Du.]

Defines the terms briefly, and gives in some cases English, French, German and Spanish equivalents.

182.1. Palaeoecology. History of Vegetation

See also No. 1991.

1963. KULP, J. L., FEELY, H. W., and TYRON, L. E. **Lamont natural radiocarbon measurements.** *Science* 114 (2970), 1951 (565–8). 9 refs. (*Lamont Geological Observatory Contribution* No. 49.)

Tabulates the results of C^{14} measurements on various natural C-bearing materials of geological and archaeological interest, including wood, charcoal and peat.

1964. JOVANOVIĆ, B. **Prethodna saopštenja o poljskim jasenovima i jednoj reliktnoj fitocenozi u Srbiji. [A preliminary report on Ash and a relict phytocoenosis in Serbia.]** *Glasn. šum. Fak., Beograd* No. 2, 1951 (87–100). 25 refs. [Serb.f.]

Fraxinus oxycarpa and *F. angustifolia* found on the banks of some rivers of central and north Serbia are considered to be relict species. The influence of the expanse of water covering Serbia during a recent geological period is shown by the presence of a relict phytocoenosis, *Fageto-Abietum ilicetosum* on the mountain of Goč. The optimum for Beech, as regards height above sea level, is considered to be at the meeting point of the associations *Fagetum montanum serbicum* and *Fagetum moesiacae abietetosum*.

1965. BLEWETT, M. B., and POTZGER, J. E. **The forest primeval of Marion and Johnson counties, Indiana, in 1819.** *Butler Univ. bot. Stud.* 10, Pap. No. 5, 1951 (40–52). 4 refs. A.P.B.

Presents data (i.e. species representation by number of stems and diameter classes) on trees listed in the original U.S. land survey of 1819. Results of a quadrat study of a single stand on the Fort Harrison Reservation compare very favourably with the results of the survey records, and indicate

that a survey of a small stand in little disturbed forest probably gives a fairly accurate picture of the whole.

1966. Ross, M. I. ***Pinus virginiana* in the forest primeval of five southern Indiana counties.** *Butler Univ. bot. Stud.* 10, Pap. No. 9, 1951 (80–9). 16 refs. A.P.B.

An attempt to reconstruct from historical records a picture of the distribution of *Pinus virginiana* in this region before the arrival of the first white pioneers. It seems to have been present along the Ohio River in at least Floyd and Clark counties.

1967. BEILMANN, A. P., and BRENNER, L. G. **The recent intrusion of forests in the Ozarks.** *Ann. Mo. bot. Gdn.* 38 (3), 1951 (261–82). 48 refs.

An attempt is made to reconstruct from historical records the course of recent vegetation changes in the Ozarks. Within historical time much of this region which is now forest land, was open, park-like country or grassland. Insufficient time has elapsed since the change towards forest cover began, to permit any plant association to reach a climax; 85% of the commercial forest land is classified as immature. *Juniperus virginiana* is a very aggressive invader of the grasslands and old fields. The beginning of its invasion coincides with the reduced burning of grassland that accompanied an increase in the population. There are also indications that the climate of the Ozarks has become milder and wetter.

1968. BEILMANN, A. P., and BRENNER, L. G. **The changing forest flora of the Ozarks.** *Ann. Mo. bot. Gdn.* 38 (3), 1951 (283–91). 8 refs.

A study of the soils, land use and development of tree associes during a 10-year period. A rapid invasion of the *Quercus marilandica*/*Q. stellata* and *Q. alba*/*Acer saccharum* associations by the valuable timber species *Q. borealis*, *Q. alba* and Hickory (*Carya* sp.) is taking place.

1969. LAWRENCE, D. B. **Recent glacier history of Glacier Bay, Alaska, and development of vegetation on deglaciated terrain with special reference to the importance of Alder in the succession.** *Yearbook, American Philosophical Society, Philadelphia 1950*, 1951 (175–6). L.S.

1970. AUER, V. Consideraciones científicas sobre la conservación de los recursos naturales de la Patagonia. **[The conservation of natural resources in Patagonia.]** *Idia* 4 (40/41), 1951 (1–36). [Span.] C.G.B.

Presents a summary of some of the findings of the Finnish expeditions which visited Patagonia in 1928 and 1937–8 to study the effects of the increasingly dry climate on the vegetation, with some later observations of the author's. The changes in composition of the retreating forests, and the effects of drought on the peat bogs, are briefly described [cf. *For. Abstr.* 11 (No. 1677)]. The effects of erosion in the steppe are also studied. By correlating the findings of pollen analyses with geological observations an attempt is made to reconstruct the history of climatic and vegetational fluctuations in Patagonia during the post-glacial period, and a map is presented showing the distribution of *Nothofagus pumilio* at three different stages within that period. Some exotic species suitable for reforestation are listed.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 1967–70.

1971. **[Ecology of Mangrove pioneers.]** *Rep. For. Dep. Tanganyika 1950*, 1951 (16).

The ecological status of the two Mangrove pioneers, *Sonneratia* and *Avicennia*, was investigated. *Sonneratia* appears to be confined to areas that are waterlogged even at low spring tides, whereas *Avicennia* has a wide range of tolerance from waterlogged to relatively dry sites. *Avicennia* has light seeds and more efficient dispersal over short distances and may thus occupy a site that would otherwise be filled by the light-demanding *Sonneratia*. [Cf. *For. Abstr.* 13 (No. 1941).]

1972. CYMEK, A. A. **O gruppovom raspredelenii derevjev v smešannyh hvoĭno-listvennyh lesah Daljnego Vostoka. [The group occurrence of trees in the mixed conifer/hardwood forests of the Far East.]** *Lesn. Hoz.* 3 (7), 1950 (63). [Russ.]

Refers to the prevalence of pure groups of advance growth, in the natural mixed forests of the Far East, as the ordinary mode of reproduction. Alternation of dominants is the general rule, as successful regeneration of a given species usually takes place only under the canopy of another. Under natural conditions *Pinus koraiensis* regenerates best under a light canopy of hardwoods, and it has been claimed that its normal development is possible only under canopy. In the Khabarovsk arboretum, however, group sowings of this Pine have developed well without any canopy whatever, and growth in such groups has been much faster than that of isolated individuals. Spruce, Fir, Birch and Maple are said to compete with other species more successfully in groups than as single trees.

182.4. Layer Communities

See also Nos. 1812–4, 1989.

1973. COILE, T. S. **Effect of soil on the development of hardwood understories in Pine stands of the Piedmont Plateau.** *Proc. Soil Sci. Soc. Amer. 1949*, 14, 1950 (250–2). 3 refs. L.S.

In connexion with an earlier study [cf. *For. Abstr.* 10 (No. 1499)] hardwood understorey species over 4½ ft. high were enumerated by diameter classes, and the effect of age and density of the Pine overstorey and of various soil factors on the density, or space occupied by the main understorey species, was determined by regression analysis. The soil variables tested were: depth of the A horizon in inches, imbibitional-water value of the B horizon, site quality of the land, and the texture of the surface soil (i.e. coarse-, medium-, and fine-textured). The relationships between the variables and the space occupied (milliacres per 200 milliacres) are presented in formulae and graphs for *Cornus florida*, *Liquidambar styraciflua*, and *Juniperus virginiana*. These correlations, which relate to

ca. 70% of the total understorey of the average Pine stand, are considered useful in estimating the competitive hardwood potential of any land in the Piedmont region.

1974. PHILLIPS, E. A. **The association of bark-inhabiting bryophytes in Michigan.** *Ecol. Monogr.* 21 (4), 1951 (301–16). 28 refs.

1975. SÁ NOGUEIRA, G. DE BARROS DE. **Importância das Muscíneas na biologia de floresta. [Importance of mosses in the biology of the forest.]** *Publ. Serv. flor. aquic. Portugal* 14 (1/2), 1947 (131–4). [Port.e.]

Discusses the rôle of mosses in the forest, particularly as indicators of soil pH and as moisture absorbers. Some examples are cited.

1976. TAMM, C. O. **Growth and plant nutrient concentration in *Hylocomium proliferum* (L.) Lindb. in relation to tree canopy.** *Oikos* 2 (1), 1950 [1951] (60–4). 6 refs. [E.e.] [Forest Research Institute of Sweden, Experimentalfältet.]

In a moss community under Spruce, composed mainly of *Hylocomium proliferum*, the annual production of dry matter in the mosses and their concentrations of N, K, and P, were studied in relation both to light intensity and to the distance of the mosses from the nearest tree crown. Light intensity appeared to be a limiting factor for the growth of *H. proliferum* only when it occurred immediately beneath the crown of a tree. Elsewhere moss growth was found to decrease as the distance from the nearest tree crown increased. This may be due to decreasing amounts of plant nutrients reaching the ground in the form of litter and rain washings from the crowns of the trees. [Cf. *For. Abstr.* 13 (No. 61).] *From author's summary.*

182.5. Synecological Measurements and Methods

See also Nos. 1816, 1989, 2353.

1977. KREFTING, L. W. **Construction of the Lake States deer exclosure.** *Tech. Note Lake St. For. Exp. Sta.* No. 361, 1951. pp. 2.

Describes, with illustrations, an exclosure used in the Lake States in studying the effects of browsing on forest vegetation, to keep deer or snowshoe hares out of small areas in the forest.

1978. HEWETSON, C. E. **Ecology in pictures.** *Indian For.* 77 (9), 1951 (564–7 + 6 photos).

Discusses the production of photographs of selected groups of plants, that will have ecological value.

187. *Vegetation Types*

See also Nos. 1801, 1813–6, 1822, 1832, 1909, 1926, 1930, 1941, 1971.

1979. FOURCHY, P. **Les peuplements forestiers de l'Oisans: les essences qui les composent et leur répartition. [The forests of Oisans [in the Dauphiné alps]: the species which compose them, and their distribution.]** *Ann. Éc. Eaux For. Nancy* 12 (2), 1951 (409–66 + 15 photos, 4 maps). 21 refs. [F.g.e.]

A detailed ecological study.

1980. MOOR, M. **Des groupements végétaux forestiers dans le Jura: les associations climaciques et les associations spécialisées. [Forest types in the Jura: climax associations and specialized [mainly edaphic] associations.]** *Schweiz. Z. Forstw.* 102 (12), 1951 (634–44). 6 refs. [F.g.]

Cf. *For. Abstr.* 8 (No. 2321).

1981. MOOR, M. **Das Waldkleid des Jura. [The forest cover of the Jura Mts.]** Helbing & Lichtenhahn, Basel. 1950. pp. 55 + 2 plates. [G.] (128. Neujahrsblatt herausgegeben von der Gesellschaft zur Beförderung des Guten und Gemeinnützigen.) Price *Fr.*3.50 [7*s.* 6*d.*]

A semi-popular account of the forest vegetation types.

1982. RAZI, B. A. **An account of the forests of Mysore.** *Half-yearly Journal of the Mysore University (n.s.)* 10*B* (2), 1950 (47–58). 13 refs. L.S.

Classifies the Mysore forests into 3 main types, (1) dry, (2) wet, and (3) subtemperate, and describes the most important plant associations of each.

1983. CHAPMAN, E. **Vegetation of Locust habitats [in Cyprus].** *Anti-Locust Bull.* No. 10, 1951 (2–18).

A detailed account of certain vegetation types (including *maquis* and *garigue*) in Cyprus that provide habitats for locusts [*Dociostaurus maroccanus*] in their various phases.

1984. **Preliminary study of the Negev.** *Summ. Rep. Israel Dep. For. 1950/51*, 1951 (5–6).

A preliminary ecological study made in this almost waterless region showed two main soil types —(1) desert sand, (2) *hammadas*, wide open, undulating plains covered with stones, pebbles and coarse gravel. The principal plant association in (1) is the *Haloxylonetum persici*, the leading plant of which is a tree or high scrub; that in (2) is the *Anabasidetum articulatae*. Measurements of transpiration, osmotic pressure etc., were made on these two associations. The depth of root penetration of two *Acacia* species (*A. raddiana* and *A. spirocarpa*) that occur in (2) were studied. Phenological investigation showed that *A. raddiana* flowers continuously during the greater part of the year, but *A. spirocarpa* only once, in May. Tests of tannin extraction from the bark of *A. raddiana* gave poor results, the bark containing only 2% of tannins.

1985. FERNÁNDEZ DE CÓRDOBA, L. C., and ORTUÑO MEDINA, F. **Estudio sobre la vegetación y la flora forestal de las Canarias occidentales. [Study of the vegetation and forest flora of the western Canary Islands.]** Instituto Forestal de Investigaciones y Experiencias, Madrid. 1951. pp. x + 465 + 165 photos + 12 plates + 8 maps + 6 dgms. [Span.]

A comprehensive study in three parts of the vegetation of Tenerife, La Palma, Gomera and Hierro. Part I deals with the topography, climate and vegetation of each individual island. Part II is a study of their most important plant associations, viz. (1) Pine associations—with extensive notes on *Pinus canariensis*, its growth rates, the structure and properties of the wood, and the artificial regeneration of the stands; (2) Juniper associations; (3) the

Laurisilva; (4) *Myrica* and *Erica* associations; (5) leguminous mountain scrub; and (6) the xerophilous associations of the lower altitudes. Part III consists of an annotated list of the woody species of the Canaries.

1986. CAPDEVIELLE, J. M. Tres estudios y un ensayo sobre temas forestales de la Guinea continental española. **[Three studies and an essay on the forests of Spanish Guinea.]** Consejo Superior de Investigaciones Científicas, Instituto de Estudios Africanos, Madrid. 1949. pp. 235 + 4 maps. [Span.] Price [£1. 1*s*.]

A treatise dealing in fairly general terms with: (1) The ecology of the equatorial forests of Africa, and recommendations for their better exploitation, with special reference to the possibilities of Gaboon (*Aucoumea klaineana*). (2) Phytosociological aspects of the equatorial forests of Spanish Guinea. (3) The critical and analytical approach to problems of forest exploitation. (4) The intensifying of forest exploitation in Spanish Guinea through the agency of a proposed single organization co-operating with the state.

1987. GOULÃO, C. DE ASSIS. Avaliação do arvoredo numa parcela da floresta Maiumbense. **[Appraisal of the forest vegetation of a plot in the Maiombe forest.]** *Agron. angol.* No. 3, 1950 (95–101). [Port.f.e.]

Presents, with tables, the results of a study of the composition and constitution of an area of 500 ha. in the Maiombe forest.

1988. GARCIA, J. G. Sobre a composição floristica das formações florestais do planalto de Chimoio. **[The composition of the forest formations of the Chimoio plateau [,Mozambique].]** Ministério das Colónias, Junta de Investigações Coloniais, Lisboa. 1950. pp. 21 + 1 map + 7 photos. [Port.f.e.]

Includes notes on timber trees.

1989. COURTEMANCHE, A. Spectre biologique du *Populetum tremuloidis* dans le sud-est du Canada. **[Biological spectrum of the *Populetum tremuloidis* in south-eastern Canada.]** *Annales de l'ACFAS, Montréal* 15, 1949 (120–2). 7 refs. [F.] L.S.

1990. HANSON, H. C. **Characteristics of some grassland, marsh, and other plant communities in Western Alaska.** *Ecol. Monogr.* 21 (4), 1951 (317–75). 69 refs.

Shrub and forest communities that were studied, included Alder (*Alnus fruticosa*), Scrub Birch (*Betula glandulosa*, *B. nana* and *B. resinifera*), Willow (*Salix alaxensis*, *S. richardsonii*, and *S. pulchra*) and Sitka Spruce and White Spruce stands. Compared with grassland stands, the soil was shallower, rocks were more numerous on or near the surface, the soil showed more podzolization, and the root systems were shallower. Permafrost was encountered at a depth of about a foot in the Scrub Birch stands in north-western Alaska.

1991. HUECK, K. Nuevos métodos de investigar panoramas primitivos. **[New ways of exploring primitive landscapes.]** *Cienc. & Invest., B. Aires* 7 (11), 1951 (483–6). [Span.] A.P.B.

Reconstructs, from a study of relicts, a picture of the forests formerly surrounding Tucumán City, now a deforested area, and suggests that such studies should be more frequently used in planning reforestation.

1992. GOMES, R. C. V. MONTEIRO. Reconhecimento preliminar das formações florestais no Timor português. **[A preliminary study of the forest formations of Portuguese Timor.]** *Estudos Ensaios e Documentos, Ministério das Colónias, Lisboa* No. 5, 1950. pp. 80 + 48 plates + 1 map. 27 refs. [Port.f.e.g.]

Cf. *For. Abstr.* 13 (No. 1926).

2. SILVICULTURE

See also Nos. 1791–3.

1993. ZENTGRAF, E. Waldbau. **[Silviculture.]** Carl Winter, Universitätsverlag, Heidelberg. 1951. pp. viii + 166. 44 refs. [G.]

An outline originally prepared as a companion to the author's lectures, and thus not intended to be read as a complete exposition of the subject but to be supplemented by study of the selected references to literature (almost all German) which are given under each of the topics dealt with. The work covers fundamentals of silviculture, the technique of tending and regeneration, conversion of stands (as regards composition or silvicultural system), the Dauerwald concept, and the aims of silviculture in the future, with emphasis on the need for a closer approach to nature in the composition, constitution and silvicultural treatment of production forests.

1994. ILVESSALO, Y. Peruspyrkimyksiä Lapin metsien käsittelyssä. **[Principal aims in the treatment of the forests of Finnish Lapland.]** *Metsät. Aikak.* 1951 (1), (5–8). [Fi.e.]

Forest land, good and poor, comprises about 70% of the total area. The main aim of management should be to regenerate the many over-mature forests and younger inferior stands. More and better thinnings should be done, and Scots Pine, the most productive species in Lapland, encouraged. A possible rotation is one of 100–120 years, which would yield small timber; to produce normal sawlog sizes would require a rotation of 150–60 years, twice that needed in S. Finland. *From author's summary.* [Cf. *For. Abstr.* 13 (No. 2648).]

1995. WIEDEMANN, E. Die Kiefer 1948: waldbauliche und ertragskundliche Untersuchungen. **[Scots Pine 1948: studies of silviculture and growth.]** Verlag M. & H. Schaper, Hannover. 1948. pp. 337. 69 refs. [G.g.] Price *DM*18 [£1. 14*s*. 0*d*.]

A monograph based on the results of 20 years' research by the Prussian Forest Research Institute, relating to Scots Pine on the N. German plain, in extension of Schwappach's work. The main topics

dealt with are:—(*A*) *General growth studies:* the 1943 yield table for moderately thinned stands; development and structure of even-aged stands; relation of growth to site, seed origin, and former treatment of the forest. (*B*) *Formation of stands:* soil cultivation (methods; effects on soil, root development and increment); sowing vs. planting; spacing trials; other measures. (*C*) *Care of soil and stand:* beeting; hoeing between rows; protection against *Lophodermium pinastri*; game damage; manuring; cleanings; pruning; introduction of admixtures of other species; care of soil in older plantations. (*D*) *Thinning and increment fellings:* effects of different thinning grades and increment fellings on growth factors and yield; influence on soil; crown studies; thinning from above; thinning trials at other research stations. (*E*) *Regeneration under shelterwood, and the uneven-aged Pine forest:* natural and artificial regeneration under shelterwood; several-storeyed Pine forest and forms of regeneration. (*F*) *Mixed Pine forest:* underplanting with Beech; Pine with underwood of Spruce; two-storeyed high forest; even-aged Pine/Beech and Pine/Spruce, these last only briefly discussed in view of earlier papers by Bonnemann and Wiedemann. [See *For. Abstr.* 2 (32); 5 (248).]

1996. KADAMBI, K. ***Morus alba* Linn. (The common Mulberry.)** *Indian For.* 75 (11), 1949 (1951), (459–66 + 1 photo).

Silviculture and rate of growth in India.

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORM OF STAND

221. *High Forest Systems*

See also Nos. 2013, 2019–20, 2330.

1997. LEXEN, B. **Harvesting of Lodgepole Pine.** *Abstr. in Journal of the Colorado-Wyoming Academy of Science, Boulder, Colo.* 4 (1), 1949 (44). L.S.

Discusses the value of various silvicultural systems for *Pinus contorta* var. *latifolia*, and recommends alternate-clear-strip felling, which avoids the formation of large, unbroken areas of slash, and reduces windthrow among seed trees.

1998. JOHNSON, R. S. **Mersey Paper Company's experience with partial and selection cutting.** *Pulp Paper Mag. Can.* 52 (12), 1951 (132, 134). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1201 (*F*–2) Appendix A.)

Increment borings of 190 residual Spruce (tabulated) showed an increase of 30% in average annual d.b.h. growth rate in even-aged and of 41% in all-aged stands for the 5 growing seasons following selective or partial felling as compared with the 5 seasons before felling. Some trees, especially the dominants before felling, still showed no response; a number of others had increased their diameter growth rate by 100–300%. In most areas selectively felled, regeneration is good. Conclusions drawn as to danger of windthrow are: (1) In even-aged Spruce stands over 100 years old with little or no understorey, removal should be light, probably not more than 30% by volume, especially if the trees are tall with small short crowns. (2) Strict control should be kept to ensure that only marked trees are felled, and marking should be done carefully. (3) Spruce appears to be more windfirm on shallow rocky soil with numerous boulders than on deeper soils. (4) Allowance should be made in marking if roads are to be closely spaced; the volume to be removed, including that cut for roads, dumps, etc., should not exceed 50% of the total merchantable volume in Spruce, Balsam or Hemlock, and 60% in White Pine stands. (5) A safety margin of 10 or 15% should be allowed in marking for maximum cut.

1999. BALDWIN, H. I. **Damage to advance reproduction in selective logging.** *Fox For. Notes N.H. For. Dep.* No. 46, 1950. pp. 2.

A survey was made to determine the extent of damage to advance growth in a selectively cut Pine/Hemlock stand. It was concluded that, with care, $\frac{3}{4}$–$\frac{7}{8}$ of the advance growth can be conserved. The greatest injury was done to trees 4–5 ft. high. Small seedlings were least damaged when logging was done on snow. Hemlock was least susceptible to damage, followed by Spruce, and then by Pine.

222. *Coppice, Pollarding and Lopping Systems*

See also No. 2007.

2000. COINTAT, M. Le tremble dans la forêt du Der. [***Populus tremula* in the forest of Der (Haut Marne).**] *Rev. for. franç.* 1951 (12), (759–62). [F.]

Aspen was favoured as a standard over coppice in the 19th century, but its place was later taken by Lime and then by Birch. A comparison is made between increment of Aspen on marls and on calcareous soils.

2001. CHATURVEDI, M. D. **Rotational lopping of *Eucalyptus* in the Nilgiris.** *Indian For.* 77 (12), 1951 (726–8).

Experience gained in private estates suggests the adoption of regulated lopping of the state fuel plantations of Eucalypts (mainly *E. globulus*, *E. eugenioides* and *E. paniculata*) for oil production. Retention of $\frac{1}{3}$ of the crown at the top, and a rest of 4 full growing seasons between loppings, should be enforced.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

2002. DONIS, C., and MAUDOUX, E. Sur l'uniformisation par le haut: une méthode de conversion des forêts sauvages. [**Regulation from above: a method of conversion for unmanaged [tropical] forests.**] *Publ. Inst. nat. Étude agron. Congo belge (Sér. sci.)* No. 51, 1951. pp. 77 + 4 plans in pocket. 12 refs. [F.] Price *Fr.*100.

Briefly describes a method of bringing under management tropical forest that has been disturbed by earlier exploitation, and gives details of two experiments. The method consists essentially in removing non-commercial species from the overstorey, non-commercial and badly formed trees from the classes of sub-dominant and suppressed trees, shrubs of various kinds, and climber cutting, in order to let in light to existing reproduction. It

entails preliminary surveys to determine the proportion of different classes and species, and the amount of climber growth and of reproduction present. Soil studies and measurements of relative illumination are also necessary. Some indication is given of the amount of man-power necessary for carrying out these operations.

2003. PISON Y NEBOT, M. M. DE. Defensa del método denominado 'ordenar transformando'. [Defence of the method of conversion to regular forest by successive regeneration fellings.] Sección de Publicaciones de la Escuela Especial de Ingenieros de Montes, Madrid. 1948. pp. 108 + 4 plates. [Span.]

The author deplores the general abandonment in Spain of the system of conversion of irregular forest to regular forest by means of successive regeneration fellings, as set out in the instructions for the management of public forests, and he discusses the following reasons for the past failure of the system in Spain: (1) In poor, open stands, regeneration fellings in periodic blocks were often replaced by improvement fellings over the whole area, with consequent inadequate regeneration. (2) Regeneration fellings were abandoned in many areas because the cost of building roads and working approaches for extraction was greater than the estimated returns from the stand. In some types of forest also, particularly in the *Pinus pinaster* stands of the Segovian plain, grassing-over prevented natural regeneration. (3) In certain forests, such as those around Madrid, regeneration was spoilt by campers, tourists etc. (4) Working plans were often not systematically carried out. (5) Owing to ignorance of the requirements of different species, fellings were often not intensive enough to allow good regeneration. The author affirms that with the selective fellings now practised over a large area of the state forests, regeneration is not satisfactory, and the progress and development of the stands cannot be estimated except by complicated methods such as the 'méthode du contrôle'. He cites an example of a properly managed stand in Segovia, which was successfully converted to regular forest by successive regeneration fellings in periodic blocks, and presents data on the progress and development of the stand which are an ample vindication of the method as applied to Spanish conditions.

2004. JAGERSCHMIDT. Un problème forestier à l'ordre du jour: la transformation des pessières pures en peuplements mélangés. [A current silvicultural problem: the conversion of pure Spruce stands to mixed forest.] *C.R. Acad. Agric. France* 37 (14), 1951 (545–8). [F.] A.P.B.

Discusses the problem of soil exhaustion under pure Spruce, and reviews work done in the region of Vielsalm (upper Ardennes) where pure Spruce stands have been converted to mixed forest by strip-and-group felling. Gaps of about 10 ares (36 m. in diameter) are made to permit the introduction of other species as an understorey, the object being to create a stand with 60% Spruce, 20% Beech and 20% Fir. The gaps are then extended, by further regeneration fellings made every 3 years, in a south-south-westerly direction. The conversion is best begun when the Spruce is 50–65 years old, and the whole process may take between 20 and 40 years to complete.

2005. DALY, E. G. Development of an Aspen/White Birch/Maple stand. *Silv. Leafl. For. Br. Can.* No. 55, 1951. pp. 3.

In 1921 a 60-year-old second-growth mixed stand of Aspen (*Populus tremuloides* and *P. grandidentata*), White Birch (*Betula papyrifera*), and Maple (*Acer nigrum* and *A. rubrum*) was logged for Poplar splintwood and two permanent sample plots established in the cut-over area. It was hoped that removal of the Aspen would encourage the development of the conifer reproduction (Balsam Fir and Spruce) that existed in the understorey. Logging removed 90% of the Aspen (representing 85% of total volume and 30% of total number of trees in the stand) and this was followed by cleaning to remove the greater part of the hardwood understorey in order to favour coniferous saplings. By 1948 the coniferous species, which represented only 13% of total volume in 1921, had increased to 45% of total volume.

2006. ZAĬCEV, B. D. O vosstanovlenii severnyh dubrav. [The regeneration of the northern Oak woods.] *Lesn. Hoz.* 3 (7), 1950 (31–5). [Russ.]

There is some evidence that Oak formerly occupied greater areas in N. Russia in the zone between the northern coniferous forest and the deciduous-forest zone proper. The author stresses the importance of soil characters in this region as an index to the types of site on which mixed stands (usually Aspen/Norway Spruce/Oak) cculd be converted to Oak forest by natural or artificial regeneration. Sites suitable for Oak show energetic litter decomposition, formation of mild humus layers with a low C/Ca ratio and relatively high exchangeable-Ca values. Provided that these conditions exist, Oak will succeed even on rather wet sites.

2007. BADRÉ, L. La conversion directe des taillis-sous-futaie en futaie. [The direct conversion of coppice-with-standards to high forest.] *Rev. for. franç.* 1951 (12), (753–8). [F.]

Describes a method evolved in the department of Haut-Rhin, making use of Beech wildings from neighbouring forests, which are planted out after felling all standards except seed trees, tended for 10–15 years, and then released by a final felling of all standards and coppice growth. Costs are relatively low. On this basis, the author proposes a regular system designed greatly to shorten the century-long conversion periods in vogue, and particularly applicable to coppice in eastern France.

228. *Constitution and Composition of Stands; Forms of Stand*

See also Nos. 2324, 2347.

2008. KRAHL-URBAN, J. Eichen-Betriebszieltypen. [Types of objective in managing Oak.] *Forstwiss. Cbl.* 70 (9), 1951 (553–66). 21 refs. [G.]

According to the author the object of management is to obtain the ideal form of stand at maturity, judged from both the ecological and the economic standpoint. He discusses, with special reference to German conditions, the rôle of the value of the products, the species, the type of site, and the natural

distribution and provenance of the tree, in attaining this ideal, and presents the following list of 7 standard types of Oak stand:—(1) *Quercus sessiliflora*/Beech, managed for sawtimber. (2) *Q. sessiliflora*/*Carpinus betulus*, managed for sawtimber. (3) *Q. robur*, managed for sawtimber. (4) *Q. robur*/floodplain forest. (5) Oak/conifer forests—(*a*) *Q. sessiliflora*/Pine; (*b*) *Q. robur*/Spruce. (6) *Q. sessiliflora* protection forest. (7) *Q. sessiliflora* tanbark forest.

For the mixed forests the % of each species is given and its rôle in stand development described. For all types the conditions under which such stands occur naturally are discussed.

23. REGENERATION AND FORMATION OF STANDS

2009. VLOTEN, H. VAN. Zaaien in de bosbouw. [**Sowing in forestry.**] *Jaarb. ned. dendrol. Ver. 1948/49*, 17, [1950?] (59–65 + 4 plates). 15 refs. [Du.e.]

A review, in lecture form, of Dutch literature, stressing the advantages of natural regeneration (on unprepared ground or assisted by soil scarification) and direct sowing, especially in these days of high costs of labour and planting stock. Where planting cannot be avoided, forest estates of any size should have their own nursery. Mention is made of the success, reported before the war, of temporary Douglas Fir nurseries established under a light shelterwood of Scots Pine. When tree-breeding has advanced to the production of élite planting stock, it will probably still be best to plant this among seedlings raised by either natural regeneration or direct sowing.

2010. FORSBERG, S. Några erfarenheter från skötseln av fjällskogarna inom Jämtlands län. [**Experience of the management of mountain forests in Jämtland.**] *Från Skogsvårdsstyrelsernas arbetsfält* pp. 1–8. [Sw.] *Suppl.* to *Svenska SkogsvFören. Tidskr.* 48 (1), 1950.

Experience in the forests that mark the forest limit (600–900 m. above sea level) shows that restricted felling is desirable, and that although natural regeneration of Pine may be adequate, some form of artificial regeneration is necessary for Spruce.

2011. ZIANI, P. Značaj metodike kod planiranja šumsko-meliorativni radova. [**The importance of method in the planning of forest-improvement work.**] *Šum. List* 75 (3/4), 1951 (109–21). 6 refs. [Croat.g.]

A criticism of reforestation work on degraded forest sites in Jugoslavia, citing (with sketch maps) an actual instance and showing how such areas need to be tackled systematically, both in choice of species and in location of new stands.

2012. [**Regeneration of *Cedrela mexicana*.**] *Rep. For. Dep. Trin. Tob. 1950*, 1951 (7).

It has been noted that *Cedrela mexicana* planted on highly fertile calcareous clay at Brigand Hill has not suffered severely from the shoot borer *Hypsipyla grandella*. Unfortunately there are only a few hundred acres of such land. It seems possible that the natural regeneration of *Cedrela* that does succeed, consists of particularly vigorous individuals out of a large number of seedlings. Planting is unlikely to succeed except on the most fertile soils where there is exceptionally good internal drainage.

231. *Natural Regeneration*

See also Nos. 1958, 1972, 1999, 2002–6, 2009, 2012, 2118, 2171–2.

2013. NOAKES, D. S. P. **Notes on the silviculture of the Mangrove forests of Matang, Perak.** *Malay. Forester* 14 (4), 1951 (183–96 + 8 photos). 6 refs.

Successful natural regeneration is obtained over the greater part of the annual coupe by the present system of clear felling, but post-war costs and labour difficulties are likely to restrict the amount of planting that will be possible on unstocked areas. Some improvement of technique is therefore desirable, and this article seeks to provide a background for the necessary research into the problem. After a short description of the forest and the species composing it, the possible means of seed dispersal and the factors inimical to natural regeneration are considered. Finally, past silvicultural systems and the divergent views on their merits are discussed and certain tentative suggestions put forward. *From author's summary.*

2014. TANNEHILL, G. F. **Control of hardwood underbrush by bulidozing.** *J. For.* 49 (11), 1951 (776–8). [Urania Lumber Co. Ltd., Urania, La.]

A virgin Loblolly Pine stand was logged, removing all mature and overmature Pines with the exception of a number of seed trees, and any merchantable hardwoods. The problem of removing the dense hardwood undergrowth in order to permit of Loblolly reproduction, was solved by the use of an HD-7 Allis Chalmers tractor with bulldozer blade. The driver's instructions were to knock down as much undergrowth as possible, push it into piles, and not damage the Pine seed trees. The blade was set to remove the top mat of grass and debris and cut off all small hardwoods and underbrush at the soil line. In 20 working days (in July, 1947) a single operator had completely cleared 40 acres except for the larger hardwoods and Pine seed trees, at a cost of $6·72/acre including depreciation on the machine. By the following spring the ground was carpeted with Pine seedlings (estimated at 26,000/acre), which, after 2 years' growth, averaged 1 ft. in height, while the hardwood sprouts were very sparsely scattered. It is reckoned that after another 2 years the Pine will be outgrowing these. It was also noticed that the Pine seedlings on the bulldozed plot withstood drought much better than those on untreated areas.

2015. LOGAN, K. T. **Effect of seedbed treatment on White Pine regeneration.** *Silv. Leaflet. For. Br. Can.* No. 54, 1951. pp. 2.

The preparation of a seedbed by a severe burn or by removing litter to expose mineral soil had a very favourable influence on germination and establishment of White Pine (*P. strobus*) seed in both direct sowing and natural seeding. Where Hazel thickets obstruct reproduction, these treatments may be particularly effective, by controlling the shrub for 10 years, so that reproduction may become established. There was some indication that burning is in itself advantageous, possibly through the addition of ash.

2016. RALSTON, R. A. **Successful natural Jack Pine regeneration.** *Tech. Note Lake St. For. Exp. Sta.* No. 363, 1951. pp. 1.

A tabulated summary of results after 10 years shows that satisfactory stocking can be obtained on clear-felled areas by cross-disking to expose about 60% of the mineral soil surface and at once scattering cone-bearing slash evenly over the scarified soil.

2017. PHELPS, V. H. **Survival of White Spruce seedlings.** *Silv. Leafl. For. Br. Can.* No. 56, 1951. pp. 2.

Experimental scarification with a disk harrow to expose mineral soil in an undisturbed White Spruce stand, greatly increased both establishment and survival of reproduction.

2018. CARLQUIST, C.-G. Markberedning i höjdlägen. [**Soil scarification on high ground.**] *Svenska SkogsvFören. Tidskr.* 48 (4), 1950 (426–9). [Sw.]

An examination was made of regeneration on areas in N. Sweden, at 300–500 m. alt., which had been scarified without burning over during the last 10 years. The essentials for success include (1) at least 25 or preferably 50 seed trees per ha., (2) sufficient ripening of the raw humus after felling; (3) a good seed-year after scarification; (4) careful siting of the scarified patches; and (5) a method of scarification suited to the climate and other local conditions. Failure in regeneration was most frequent when too much of the bleached layer was exposed, and spring drought after autumn rains hardened the surface too much for seeds to grow. Long narrow patches cutting through the mineral earth to a depth of 5–10 cm. are recommended for the less stony, fine moraine soils. The patches can be either rectangular or triangular in cross-section. Transplanting young plants from patches with dense regeneration is considered preferable to creating uneven-aged stands by a further and more thorough scarification where regeneration has failed.

2019. TIRÉN, L. Om hyggesgranen och dess betydelse för de norrländska granskogshyggenas föryngring. [**Spruce cull trees and their importance in the regeneration of felled Spruce areas in northern Sweden.**] *Medd. SkogsforsknInst., Stockh.* 39 (8), 1951. pp. 28. 5 refs. [Sw.e.] Price *Kr.*1.

A study was made of seed viability, seed production, and prospects of regeneration of Spruce on 3 areas where cull trees had been left as the only seed source. Seed viability was roughly the same as that from normal trees. For both cull and exploitable trees, viability and seed production decreased with increasing height above sea level. An estimate of seedling production over a period of years indicated that although leaving trees of rather larger diameter (15 instead of 10–11 cm.), with a minimum of about 50 trees per ha., will give satisfactory regeneration at up to 300 m. above sea level, at higher levels scarifying or burning over the areas near the seed trees will be necessary, in addition to leaving a minimum of 50 trees of larger diameter. There is a full English abridgement, and legends to graphs and tables are given in English.

2020. ŠIŠKOV, I. I. Elovye semenniki na ploščadjah splošnoj vyrubki. [**Spruce seedbearers on 'clear-felled' areas.**] *Lesn. Hoz.* 3 (7), 1950 (61–2). [Russ.]

One of the difficulties of obtaining prompt natural regeneration of Spruce on large clear fellings is the absence of seedbearers within reasonable range. Observations by a number of eminent Russian research workers have shown that, contrary to general belief, it is possible to leave seedbearers without serious risk of windthrow on certain site types, provided that attention is paid to the type of tree selected for this purpose. (1) On sandy to light clay, slightly podzolized, well drained loam soils of the forest types *Piceetum oxalidosum*, *P. tiliosum* and *P. pulmonariosum*, Spruce seedbearers can be left as isolated trees. (2) On peat-podzol clay-loams to clays, with poor drainage, of the types *P. myrtillosum*, *P. polytrichosum* and *P. sphagnosum*, and on marshy bottomland soils, Spruce is not windfirm, and seedbearers cannot be left. (3) On clay-loams to sandy loams, with medium podzolization and more or less satisfactory drainage, of the types *P. oxalidoso-myrtillosum*, *P. herbosum* etc., seedbearers can be left if carefully selected for windfirmness.

The seedbearers should preferably be trees that have grown for at least 10–15 years in relatively open positions, with at least 5–6 well developed rootspurs, symmetrically disposed, more or less horizontally but buried in the mineral horizons of the soil. The trees should be well developed, with long, compact, narrowly pyramidal, pointed crowns, and dark-green foliage; their age should not exceed 100–120 years, with a diameter of 20–30 cm.; and their bark should be fissured rather than scaly, with the bottoms of the fissures carmine-red. If uniformly distributed over the area, there should be ca. 10 trees/ha., or if irregularly distributed, 15–20. For successful regeneration, it is essential either to burn the ground cover or to scarify the soil mechanically.

232. *Artificial Regeneration*

See also No. 1985.

2021. CAÑCIO MORENZA, G. Notas sobre las repoblaciones en las proximidades de Madrid. [**Notes on reforestation in the neighbourhood of Madrid.**] *Montes, Madrid* 7 (41), 1951 (364–73). [Span.]

Mainly notes on the Pines used in this project, with particular reference to *Pinus pinea*. The notes deal with raising from seed, planting, tending, pest control, growth and development.

2022. LAMB, F. B. **Primavera, important furniture wood of Central America.** *Carib. For.* 12 (2), 1951 (75–91). 11 refs. [E.Span.]

Methods of propagating *Tabebuia donnell-smithii*, the establishment and tending of plantations, yields, diseases, costs and returns.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 1940, 1970, 2045, 2093 *et seq.*, 2143 *et seq.*

2023. WITTICH, W. Die heutigen Grundlagen der Holzartenwahl dargestellt am Beispiel des

nordwestdeutschen Waldgebietes. [The present-day bases of the choice of species, using the N.W. German forest region as an example.] M. & H. Schaper, Hannover. 2nd ed. (rev.), 1948. pp. 67. Many refs. [G.] Price *DM*3.

Cf. *For. Abstr* 11 (No. 2652).

2024. HOME, SIR J. E. **The influence of introduced species of conifers in forestry practice [in Great Britain].** *Scot. For.* 5 (4), 1951 (122–8).

2025. BOLTON, LORD. **The place of hardwoods in British forestry.** *Quart. J. For.* 45 (4), 1951 (213–21). With discussion.

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 2144–8, 2180.

2026. JAMES, N. D. G. **An experiment in forestry.** Basil Blackwell, Oxford. 1951. pp. viii + 102 + 6 photos. 7 refs. Price 10*s.* 6*d.*

A detailed account, for each plot, of history, treatment, growth and present condition, of the experimental plantations of a number of native and exotic species, established 1903–5 at the Royal Agricultural College, Cirencester.

2027. SMITT, A. Fremmede treslag i Vest-Norge. [Exotic species in W. Norway.] *Tidsskr. Skogbr.* 58 (6), 1950 (115–22). [Nor.]

Gives tabulated data on the quantities of seeds and plants of some exotic species used between 1928 and 1949, and of volume and increment from stands of Sitka Spruce, Hemlock, *Abies grandis*, *Thuja plicata*, and *Larix* spp.

2028. FLENSBORG, C. E. Fra Islands skovsag. [Forestry in Iceland.] *Hedeselskabets Tidsskrift, Viborg* 71 (3), 1950 (47–59). [Dan.] C.G.B.

Describes the progress of forestry in Iceland during the last 50 years [cf. *For. Abstr.* 13 (Nos. 2046, 2651)] and gives details of some experimental plantings. Natural Birch scrub, fenced against domestic animals, has grown to a height of 10–15 m. Trials have been made of growing conifers from plants or seed of suitable provenance, often in the shelter of the Birch scrub. Scots Pine from N. Norwegian seed sown in 1933 are doing well, and sowings on heathland after light cultivation appear to be successful. Norway Spruce from N. Norway planted early in the century has reached a height of 10 m. and is ripening seed. The 5 remaining trees of *Picea engelmanni*, planted 1904–5, now average 10 m. in height, and plants raised from their seed are promising. Several hundred Larch of unknown provenance, ca. 30 years old, are about 10 m. high and in 1949 ripened seed which is being sown in the nurseries. In 1939, 6,000 Larch from Archangel were planted in the east of Iceland; they are now 4–6 m. high. Larch does not appear to do well in the moist climate of S. Iceland but Sitka Spruce does. The oldest trees, planted in 1937, had reached a height of 5 m. but were damaged in Hekla's latest eruption. Mountain Hemlock [*Tsuga mertensiana*] grows very slowly but appears to be hardy. Cuttings of *Populus trichocarpa* var. *hastata* brought from Kenai in Alaska 6 years ago are 3·5 m. high although they have been transplanted twice after being buried in the eruption. Trials have begun with Birch seed from Alaska and N. Norway, and *Nothofagus* spp. from Chile and Argentina. During 1948, about 200,000 plants, mainly from seed of native Birch and *Sorbus aucuparia*, but including Sitka Spruce, Scots Pine, and Larch, were distributed from the Icelandic nurseries. Grants of Kr.100,000 were made to the forestry societies by the state in 1947, and there is an annual grant of Kr.4–500,000 to the State Forest Department. [Cf. *For. Abstr.* 2 (35).]

2029. BJARNASON, H. **A brief report on the reforestation of Iceland.** [Skógrækt Ríkisins, Reykjavík.] 1951. pp. 14. [E.]

The soil and climatic conditions of Iceland are discussed, and similarities in the temperature and rainfall of Iceland, N. Norway and Alaska are shown from monthly averages of 6 stations in Iceland, 5 in Alaska, and 8 in Norway at different altitudes. Between 1899 and 1913 seed and seedlings of different species were introduced into Iceland and planted in the south, north and north-west of the country. The growth of these species (*Pinus sylvestris*, *P. mugo*, *P. aristata*, *P. cembra*, *Picea engelmanni*, *P. abies*, and *Larix sibirica*), their present dimensions, and their resistance to frost and insect attack are briefly described. *Pinus mugo*, *P. aristata*, *Picea engelmanni*, and *P. abies*, have ripened seed. All the seeds and seedlings imported during this period came from places with a milder climate than Iceland. Since 1936 the following species have been introduced: *Larix sibirica* from seed from Archangel; *Picea sitchensis*, plants and seedlings from Norway but of Alaskan provenance, and seed from Alaska; *Picea glauca*, *Tsuga mertensiana* and *T. heterophylla* seed from Alaska; *Picea engelmanni* plants from Norway from seed 9,200 ft. above sea level in Colorado; *Abies lasiocarpa* plants from Oregon, 5,200 ft. above sea level; *Pinus sylvestris* seed and seedlings from Norway; *Picea abies* from the northernmost limit of the species in Norway; *Pinus contorta* seed from Canada, probably British Columbia; *Populus trichocarpa* var. *hastata* from Alaska; and *Ulmus glabra* from N. Norway. Results so far available for each species are discussed and are considered promising.

2030. PÁLSSON, G. Lerkitrén á Hallormsstað. [Larch at Hallormsstaður.] *Ársr. Skógræktarf. Íslands 1947* (20–7). [Ice.]

Gives figures of maximum and average height and diameter in 1945 for 214 trees of *L. sibirica*, from 1913 sowings planted out in 1922. Height ranged from 3 to 10·3 m., and diameter from 3 to 20 cm. Annual increment/ha. is 3 cu.m. as against an estimated 1 cu.m. for Birch in similar conditions.

2031. **[Effect of drought on exotic conifers.]** *Rapp. Fonds for. nat. Jan./Dec. 1949*, 1950 (25). [F.]

The exceptional drought of 1949 caused serious injury to experimental plantations in France. *Tsuga heterophylla* suffered most severely and it is clear that it should be limited to damp regions. *Abies grandis* was, on the whole, remarkably resistant; *Pseudotsuga taxifolia* was rather less so. The direct ill effects of the drought were reinforced by indirect effects—e.g. forest fires and plagues of voles and rabbits.

2032. Note sur les essais d'introduction d'*Eucalyptus* en France métropolitaine. **[Experiments in the introduction of Eucalypts in France.]** *Rapp. Fonds for. nat. Jan./June 1950*, 1950 (xv–xvi). [F.]

Experimental sowings were made in various parts of France in 1947. The following conclusions are drawn. Seedlings must be raised under glass so as to be sufficiently advanced to stand the winter. Transplanting is difficult and can only be done near the nursery. Even the most resistant species are very susceptible to early frosts and to dry winter frosts, and the severe weather of the years 1947–9 caused all the experiments to fail except those in the Médoc. In that region some species did well, notably *E. stellulata*, which proved fairly frost-resistant and attained a height of 3 m. after 3 growing seasons. A special nursery is to be established near Bordeaux to continue these experiments.

2033. Instituto Forestal de Investigaciones y Experiencias. Sección de Dendrología—Ante los eucaliptos de Huelva. **[Forest Research Institute. Section of Dendrology—*Eucalyptus* in Huelva.]** *Boletín de Información del Ministerio de Agricultura, Madrid* 4 (30), 1951 (54). [Span.]

Two of the 4 *Eucalyptus* arboreta in Spain are situated in Huelva on the diluvial sandy soils characterizing over 200,000 ha. in the south of the province. The plantations are mainly 'White' *Eucalyptus* (*E. globulus* and *E. bicostata*) and 'Black' (*E. rostrata*). Formerly the 'White' species were preferred for afforestation in this area because of their more rapid growth, light-coloured timber, and foliage suitable for oil distillation. Opinion is now divided, however. The 'Black' species can be grown more densely and hence produce just as much timber; it is cheaper to plant, more easily propagated by vegetative means, and more wind-firm; its timber is more durable and makes good charcoal; and the foliage, though not good for oil extraction, makes useful fodder. In addition, the 'White' species do not tolerate the 'algaidas', or depressions in the plain which are flooded from early autumn to the end of spring, and dry out to a hard soil in summer, whereas *E. rostrata* regenerates and develops excellently on such sites.

2034. Afridi, K. F. G. **The cultivation of some of the genus *Eucalyptus* in the scrub forests of the North-West Frontier Province.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (485–7).

Small-scale experimental sowings were made at Parachinar (altitude 5,500 ft., rainfall 25 in. per annum) with *Eucalyptus globulus*, *E. rudis*, *E. rostrata* and *E. tereticornis*. Seedlings of *E. rudis* and *E. rostrata* were all killed in the first winter, but 30% of *E. tereticornis* and 40% of *E. globulus* survived. At Thai (altitude 3,900 ft., rainfall 45 in.), sowings of *E. globulus* were a failure, but the other 3 species germinated well and survival at the end of the growing season was 80%, with average height ca. 2 ft.

2035. **[Trials of exotic species.]** *Rep. For. Dep. Nyasald. 1950*, 1951 (10–1).

Among new exotic species introduced during the year were *Cunninghamia sinensis*, *Populus deltoides*, and *Pinus caribaea* var. *hondurensis*. One thousand cuttings of *P. deltoides*, flown from S. Africa, had all made excellent growth by the end of the year. *P. caribaea* var. *hondurensis* gave a germination figure nearly four times that usual for the common strain of the species, and nursery growth was excellent. *Eucalyptus torreliana* has established itself well in Mua-Livulezi Forest Reserve and shows fair growth. It shows promise of being a suitable Eucalypt for establishment in lake-shore areas.

2036. Hall, N. **The establishment of coniferous plantations in Australia.** *Aust. J. Sci*, 13 (6), 1951 (164–8). 6 refs. O.B.D.

A brief summary of work in progress in Australia in the establishment of coniferous forests, with notes on the selection of sites and species, tree-breeding, preparation of planting sites, and planting methods.

232.12. *Races and Provenance Trials.*

See also No. 1873.

2037. Bijhouwer, J. T. P. De ceder van de Taurus. **[The Taurus Cedar.]** *Jaarb. ned. dendrol. Ver. 1948/49*, 17, [1950?] (55–7 + plate). [Du.e.]

C. libani is rarely seen in Holland and the north-eastern U.S.A., owing to its inability to withstand the severe winters. In 1902, however, seed was received at the Arnold Arboretum from a collector who had been asked for seed from the highest possible altitude in the Cilician Taurus, 200 km. north of Lebanon. The progeny, planted at Boston, have shown satisfactory winter-hardiness and good growth. Their adult habit is described as being typically that of *C. libani* (rather than that of *C. atlantica* or *C. deodara*), but taller, straighter and more slender than that of the form hitherto commonly cultivated. The Taurus form ought to be quite hardy in Holland. [Cf. *For. Abstr.* 13 (No. 1939).]

2038. Klaehn, F. U. Die deutsche Fichte in Schweden und in der schwedischen Züchtungsarbeit. **[Norway Spruce of German provenance in Sweden and in Swedish tree breeding.]** *Forst u. Holz* 6 (22), 1951 (322–3). [G.]

Cf. *For. Abstr.* 13 (No. 1121).

2039. Delevoy, G. Contribution à l'étude de quelques variétés de *Pinus nigra* Arnold en Belgique. 1. De l'influence de l'origine des graines. **[Study of some varieties of *P. nigra* in Belgium. 1. The influence of seed origin.]** *Trav. Sta. Rech. Groenendaal (Sér. B)* No. 8, 1949. pp. 16 + 4 photos. 18 refs. [F.f.flem.]

The principal strains of Black Pine cultivated in Belgium are Corsican and Calabrian. Preliminary results of provenance trials indicate that mean height increment was best in Corsican Pine from low elevations in Corsica and particularly from Belgian provenances. General vigour and frost resistance was in the following descending order—Calabrian Pine from Flanders, from Calabria, Corsican Pine from Belgium, from high elevations in Corsica, from low elevations in Corsica. [Cf. *For. Abstr.* 13 (No. 1896).]

2040. Delevoy, G. Contribution à l'étude de quelques variétés de *Pinus nigra* Arn. en Belgique. II. Les classes de productivité. **[Study of some**

varieties of *P. nigra* in Belgium. II. Productivity classes.] *Trav. Sta. Rech. Groenendaal* (*Sér. B*) No. 9, 1949. pp. 18. 10 refs. [F.f.flem.]

Taking as the measure of 'productivity', the mean height of dominants to the nearest metre at 30 years, the provenances tested are classified in the following descending order—Flanders, Corsica, Calabria, the Crimea, and the Cevennes.

2041. DELEVOY, G. Contribution à l'étude de quelques variétés de *Pinus nigra* Arn. en Belgique. III. Les conditions de milieu en Belgique et la végétation de quelques variétés de *Pinus nigra* Arn. [Study of some varieties of *P. nigra* in Belgium. III. The Belgian environment and the growth of some varieties of *P. nigra*.] *Trav. Sta. Rech. Groenendaal* (*Sér. B*) No. 10, 1951. pp. 16. 32 refs. [F.f.flem.]

Corsican Pine will grow in all parts of Belgium except the Ardennes, where the limiting factors are the low mean annual temperature, low mean temperature of the hottest month, and absolute minimum (below −21° C.) temperatures. Other adverse factors, in combination with the above, are droughty (sandy or calcareous) soils, heavy clays, and frost pockets.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

See also Nos. 1866, 1920

2042. LITTLE, S., and SOMES, H. A. **No exceptional vigour found in hybrid Pines tested.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 10, 1951. pp. 4.

Seedlings of the hybrids *Pinus rigida* × *P. taeda*, and *P. echinata* × *P. rigida*, and, for comparison, of *P. echinata* and *P. taeda*, were planted in 1945 in state nurseries in Maryland and New Jersey. The *P. rigida* × *P. taeda* seedlings showed the best survival, and the best growth in New Jersey. The *P. echinata* × *P. rigida* seedlings showed the poorest growth and survival; only 2% were still alive in New Jersey and 29% in Maryland in 1950. The ordinary seedlings of *P. echinata* and *P. taeda* generally survived better than those of *P. echinata* × *P. rigida*. *P. taeda* seedlings showed the best growth in Maryland. Neither of the hybrids tested showed exceptional vigour.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 1958, 2015, 2036, 2088, 2122, 2179.

2043. Mécanisation des travaux de reboisement. [The mechanization of preparatory work for afforestation.] *Rapp. Fonds for. nat. Jan./Dec. 1950*, 1951 (66–70). [F.]

Report on a demonstration of equipment for the mechanization of preparatory work, held at Orleans in November, 1950. The following machines are described: (1) The 'Motostandard', a motor mower with cutting bar in front, which enables it to be used in the forest. It will cut heather, bracken, broom, and coppice regrowth up to 2 years old. (2) The 'débroussailleur landais' (Darriet model), a well tried machine, proved too light for the dense heather and high broom in which it was tested. (3) The Chambord subsoiling plough, a heavy (7-ton) plough specially designed for forest work, and needing a 70-h.p. tractor. It has blades fitted to its wheels, which cut a swath 0·4 m. wide on each side, and detachable implements such as a mole-drainer for use in wet soils.

2044. GRIFFITH, A. L., *et al.* **Item 12. The effect of burning and other accessory operations upon the soil as affecting artificial regeneration.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (497–516).

[Cf. *For. Abstr.* 9 (No. 1537).] Five papers and summary of debate.

2045. AHMAD, Y. S. **Modification of plantation technique to minimize soil erosion in the Darjeeling Hills.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (199–200).

Regeneration of the Darjeeling hill forests was formerly by taungya on clear-felled contour strips, the principal agricultural crop being potatoes. Strips are now not more than 3 chains wide, and potatoes may only be grown for 2 consecutive years on any area. Spacing has been reduced to 4 × 4 ft. In order to regenerate the excess areas felled during the war, resort has been had to direct sowing on hoed, broken, contour terraces, 6 ft. long by 2 ft. wide, using principally stratified seed of *Quercus lineata* and *Machilus odoratissima*. Terraced contour lines were 6 ft. apart and the sowed patches in consecutive lines were staggered. Potatoes and other crops could be grown only between the terraces. The whole area was planted up with a nurse crop of fast growing species (*Alnus nepalensis*, *Betula alnoides*, and *Prunus nepalensis*). Three cleanings were done in the first year. In the second year the seedlings were thinned out to a 3 × 3 ft. spacing, the thinnings being used to fill gaps, and two cleanings carried out. Two cleanings were also done in the 3rd year, by the end of which the regeneration was well established.

232.3. Seed, Nursery Practice, Direct Sowing

2046. BJARNASON, H., and SÆMUNDSEN, E. G. Fræsöfnun, sáning og gróðursetning. [Seed collection, sowing and planting.] *Ársr. Skógræktarf. Íslands 1949* (53–79). [Ice.]

Discusses the collection and storage of seed, sowing methods, the time of planting, transport and storage of plants, planting tools and methods, the use of fertilizers, and plant spacing, with particular reference to Icelandic conditions. Birch seed is generally ripe in late September or early October, and Rowan at about the same time, or a week or fortnight later. Of the conifers which have so far ripened seed in Iceland, *Pinus mugo*, *P. aristata* and *Picea engelmanni* seed matures in late September or early October, and that of *Larix sibirica* somewhat later. Direct sowing is done either in autumn, or in spring, before the soil has completely thawed, generally in the first half of May in the south, and about 10 days later in the north. If sowing is later than mid-June, the growing period is too short. Good results have been obtained over 20 years by sowing Birch seed on screefed seed spots, 30 × 30 cm. where grass growth is poor, and 50 × 50 where it is rich. The normal distance between spots is

1·3 × 1·3 m., and up to 20 kg. of seed are used per ha. Early results of sowing Pine by this method in 1946 and 1949 on heather moor with little grass have been good. On bare ground, Birch and grass seed were sown simultaneously; though the Birch germinated well, many plants were lost in summer drought. The grass grew well. It is concluded that the grass should have been sown 3–4 years before the Birch. Planting methods recommended are those used in Norway. Dressing with farmyard manure is recommended, or where this is not available, with artificial fertilizers or fish meal; the latter should be well dug in or it will attract large numbers of fish-eating birds. Spacing recommended for unsheltered areas is 1–1·25 m. for Birch and Pine, 1·25–1·50 for Spruce, and 1·25–1·75 for Larch. When conifers are planted in forest land, distances may be increased by 30%, and by still more in fairly well grown Birch wood. Conifers should preferably be planted in scrub or forest, or in places where some shelter planting has already been done.

232.31. *Seed*

2047. KESARCODI, N. **[Seed collection, treatment, and storage.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (421–8).

The substance of a set of practical instructions issued to subordinate staff in Bombay Province, including notes on 51 tree species.

232.311. Seed Production (Seed Years, Seed Crops etc.)

See also Nos. 1867, 1954, 2019, 2072.

2048. GRANO, C. X. **What Loblollies are likely cone producers.** *J. For.* 49 (10), 1951 (734).

Observation in 1951 of 56 trees released from competition in 1949 indicates that size and past cone-production are the best criteria of a good seed-tree. Three-fourths of trees larger than 11·5 in. d.b.h. have 25 cones or more apiece, but only one-sixth of smaller trees have this number. Of trees that bore cones before 1949, 95% have some this year and the average is 129 per bearing tree. The corresponding figures for trees that had not borne cones before 1949 are 70% and 37.

2049. STEFANSSON, E. Bidrag till frågan om tallkottens frövärde innevarande vinter. **[The seed value of Pine cones during the present [1949–50] winter.]** *Svenska SkogsvFören. Tidskr.* 48 (1), 1950 (51–60). [Sw.]

The summer of 1949 was cool, but was followed by a long mild autumn. Cones collected from 20 trees in mid-August could not be extracted, and seeds removed by hand failed to germinate. Cones from the same batch stored until mid-September yielded enough seeds for germination experiments, but germination was low. Seeds from cones from the same trees, collected in mid-September and extracted immediately, gave a much higher germination %. Seeds from cones collected in October and at the end of November gave excellent germination results. The average 1,000-seed weight, the ease of extraction, and the seed yield, increased steadily from August to November. Results are tabulated.

2050. CHRISTISEN, D. M. **Yield of acorns from a Post Oak, *Quercus stellata*, August 1949, Indian Trail Refuge, Dent County, Missouri.** *J. Wildlife Mgmt.* 15 (3), 1951 (332–3). B.A.P.

Presents a table showing estimated 1949 yield (by diameter classes) from *Q. stellata* in this area.

2051. JOHNSSON, H. Beskärning och formning av fröträden i plantager. **[Pruning and shaping seed trees in plantations.]** *Svenska SkogsvFören. Tidskr.* 48 (1), 1950 (45–50). [Sw.]

The maximum height desirable for seed trees in seed orchards is 7–8 m. if seeds are collected from the trees, and the crown width for many hardwood species should eventually reach 4 or 5 m. Severe pruning of hardwoods in the first few years to encourage a bush-like growth is relatively simple. Only very light pruning of softwoods is possible without reducing seed production; Larch may be top-pruned successfully, but Spruce, which concentrates cone production near the top, may need root-pruning to reduce height growth. Grafting on to dwarfing stock is still in an experimental stage.

232.312. Seed Collection, Extraction and Grading

See No. 1800.

232.314. Seed Purchase, Trade and Transport

2052. DERJABIN, D. I. Opyt vesennei perevozki želudeĭ vodnym transportom. **[Trial of spring transport of acorns by water [barge].]** *Lesn. Hoz.* 3 (7), 1950 (21–4). [Russ.]

Notes on the successful transport of acorns, packed in wicker baskets, by barge on the rivers Kama and Bela from the forests of the Tartar A.S.S.R. to the Bashkir A.S.S.R. in early May, 1949, with recommendations on the prevention of deterioration during a trip of 6–8 days under conditions of spring drought.

232.315. Seed Storage and Treatment

See also No. 2080.

2053. **[Storage and viability of Ponderosa Pine seed.]** *Rep. Intermt. For. Range Exp. Sta. 1950*, 1951 (44).

Germination tests were made during 1950 on seed from the 1936 crop collected from immature stands between 4,000 and 5,500 ft. altitude. Seeds were stored in air-tight containers (1) in commercial cold storage (i) at 0° and (ii) at 32° F.; (2) in cellar storage with temperatures ranging from 30 to 55°; (3) 30 in. below ground level with temperatures probably varying between 30 and 55°; (4) in an attic with temperatures ranging from – 40° to 108°. The following preliminary results were obtained. (*a*) If ages and altitudes of parent trees are ignored, (1) (i) possessed the highest germinative capacity (69·8%), followed by (1) (ii) (65·5%), (2) (55·6%), (3) (50%) and (4) (0%). (*b*) If storage methods are ignored, seed from young normal stands at 4,000 ft. possessed the highest germinative capacity (64·4%) and that from scattered old growth at 5,500 ft. the lowest (51·6%). (*c*) The germination period extended from 5 July to 18 October.

2054. WAKELEY, P. C. **Storing southern Pine seed.** *Occ. Pap. Sth. For. Exp. Sta.* No. 123, 1951. pp. 13.

Gives directions for cold storage of seed at not above 41° F. and preferably between 5 and 32°, at a constant moisture content of between 6 and 9% for Longleaf and 9 and 12% for other southern Pines, with special recommendations for storage longer than one winter, and for shipping seed abroad.

2055. DAVID, R. **Activating germination of Maritime Pine seeds.** *Naval Stores Rev.* 61 (8), 1951 (16–7, 23–4).

An abridged translation of the article in *Bois & Résin.* [Cf. *For. Abstr* 12 (No. 2889).]

2056. CROSSLEY, D. I., and SKOV, L. **Cold soaking as a pre-germination treatment for White Spruce seed.** *Silv. Leafl. For. Br. Can.* No. 59, 1951. pp. 4. 2 refs.

Seed was soaked for 10, 15, and 20 days and part of each treatment had the water changed 3 times, while part was left unchanged. It was found that a period of 30 days was needed to obtain complete germination after cold soaking. Soaking gave significantly greater germination than the controls, and the 20-day treatment was significantly better than either of the shorter periods. Changing the water reduced germination in all three treatments. [Cf. *For. Abstr.* 11 (No. 2665).]

2057. MARCET, E. Beitrag zur Verbesserung des Keimprozentes bei der Vogelkirsche (*Prunus avium* L.). **[Increasing plant per cent in sowings of *Prunus avium*.]** *Schweiz. Z. Forstw.* 102 (10), 1951 (524–6). [G.]

Whole fruit, untreated, gave a plant % of 32. Cleaned seed gave 74%; cleaned seed with a coating of gelatine, 87%. The addition of a growth-regulating substance ('Roche 202') to the gelatine coating increased the % to 95–98. Whole fruit soaked in a solution of Roche 202 gave 0–7%.

2058. HAMILTON, J. R., and JACKSON, W. R. **Treatment of Shortleaf Pine and Loblolly Pine seed with fungicidal dusts.** *Plant Dis. Reptr.* 35 (6), 1951 (274–6). 6 refs. A.P.B.

Describes a study to determine the effect of various dosages of commercial fungicidal dusts on germination of stratified and unstratified seed of *Pinus taeda* and *P. echinata*. The results indicate that dosages of 0·25 and 0·06 % of seed weight, of the various dusts used, were more effective than 1% and, with both stratified and unstratified seed, will increase the % of emergence. No estimate of the relative value of the dusts in preventing damping-off could be made.

232.318. Seed Testing. Germination Tests. Seed Quality.

See also Nos. 1956, 2053.

2059. SARVAS, R. **Effect of light on the germination of forest tree seeds.** *Oikos* 2 (1), 1950 [1951] (109–19). [E.e.]

Laboratory tests showed that seed of *Picea abies*, *Betula verrucosa*, *B. pubescens*, and *Pinus sylvestris* germinated much more quickly in light than in darkness. With the first 3 species, however, the same final germination result was obtained in darkness and in light. *P. sylvestris*, on the other hand, yielded a considerably poorer final germination result in darkness than in light. It is concluded that care must be taken in germination tests to ensure that germinating seeds receive sufficient light, and that it is not advisable to cover seed, at least not *P. sylvestris* seed, in sprouting tests, and only lightly, if at all, in field sowing.

232.32. *Plant Rearing. Nursery Practice.*

See also Nos. 2009, 2032, 2046, 2127, 2160.

2060. OPSAHL, W. Mekanisering i Sønsterud planteskole. **[Mechanization at the Sønsterud nursery.]** *Årsskrift for Norske Skogplanteskoler 1950*, 1951 (9–14 + 18 photos). [Nor.] F.C.A.H.

An account of equipment and methods used in sowing, planting, plant lifting, weed control and packing.

2061. Referat fra Nordisk Skogunions planteskolekurs på Sønsterud. **[A report on the Scandinavian Forestry Union's nursery meeting at Sønsterud.]** *Årsskrift for Norske Skogplanteskoler 1950*, 1951 (15–89). [Nor. Dan. Sw.] F.C.A.H.

[Cf. *For. Abstr.* 13 (No. 257).] Contains papers on tree breeding (*H. Barner*); vegetative propagation (*Berthelsen*); chemical weed-control in nurseries (*T. Vidme*); forest improvement in Finland (*R. Margolin*); and Swedish nurseries (*Lewis-Jonsson*); with reports of discussion on sorting, packing, sowing methods and the size of nurseries.

232.323. Sowing and Covering

See Nos. 2059, 2069.

232.324. Transplanting and Lining Out, including Grading of Seedlings.

2062. SCOUPE, C. Rapport sur le 'Crabe'—appareil pour l'arrachage des arbres en pépinière—présenté par M. Georges Delbard. **[The 'Crabe', a machine for lifting trees in the nursery—a report presented by M. Georges Delbard.]** *Jardins de France, Paris (Sér. 7)*, 4 (5), 1950 (133–4). [F.] E.M.B.

The 'Crabe' consists of a rubber-lined collar 18 cm. in diameter, made of 2 separate hinged parts and fastened by a cotter. Attached to the collar are claws having a lever for forcing them into the soil. The collar is fastened round the stem of the tree and the claws are forced into the ground so that they engage beneath the roots. The whole (tree, collar and claws) is then drawn up by means of a cable and a winch supported on a tripod. The apparatus is eminently suitable for uprooting trees in the nursery, since it greatly reduces the risk of damage to the roots and stem.

232.325. Tending (in both Seedbeds and Transplant Beds)

2063. THORKILDSEN, R. Litt om forsøk med flammekaster i Sønsterud planteskole sommeren 1950. **[Experiments with a flamethrower in the Sønsterud nursery during the summer of 1950.]** *Årsskrift for Norske Skogplanteskoler 1950*, 1951 (90–1). [Nor.] F.C.A.H.

The experimental area was sown with Spruce on 1 June, and the weeds were burnt down with a Hauck flame-torch of 4½ litres capacity on 10 June. Examination on 4 July showed about 50% fewer weeds on the treated area, and the first hand-weeding took only half the time. Eight days after the first weeding there were 20% more Spruce plants on the treated area, probably because the young plants had suffered less damage during weeding.

2064. VIDME, T., and BYLTERUD, A. Orienterende forsøk med kjemiske midler mot ugras i bartreplanteskoler, 1949. **[Preliminary trials on chemical weed control in conifer nurseries, 1949].** *Årsskrift for Norske Skogplanteskoler 1950*, 1951 (92–104 + 3 tbls.). [Nor.e.] F.C.A.H.

During summer 1949, 55 trials were carried out in nursery beds of Norway Spruce and Scots Pine, using different concentrations of Shell Weed-killer (a mineral oil of the white-spirit type), white spirit, sulphate turpentine, and $FeSO_4$. Results showing the % of weeds of different species killed, and the amount of damage to Spruce and Pine, are tabulated. Shell Weed-killer and white spirit gave equally good results. Damage to trees 1–4 years old by amounts of up to 100 litres dekare was negligible, but spraying in seedbeds during the first few weeks after germination killed most of the seedlings. When spraying closely followed weed germination, an application of 75 litres/dekare was enough to control *Poa annua*, *Spergula arvensis*, *Stellaria media*, *Sagina procumbens*, *Arenaria serpyllifolia* and other common nursery weeds. Sulphate turpentine was more effective in destroying weeds, but at rates of 75 and 150 litres/dekare it damaged Pine and Spruce plants severely. A 25% solution of $FeSO_4$ at rates of 75 and 150 litres/dekare gave fairly good control of *Stellaria media* and *Spergula arvensis*. It did no damage to seedlings and may be used in seedbeds before the seedlings are resistant to mineral-oil sprays. [Cf. *For. Abstr.* 13 (No. 257).]

2065. COSSITT, F. M. **Use of petroleum products as selective herbicides in Southern Pine seedbeds.** *J. For.* 49 (11), 1951 (773–5). 7 refs.

Reviews progress and tabulates data on the effect of 'mineral spirits' on a number of weed and grass species common in Southern nurseries. During 3 years of trial and error by the U.S. Forest Service it has been found that good results are obtained with small applications at frequent intervals. In 1947, 40–80 gal./acre every 3–4 weeks was believed necessary. General practice to-day uses only 10–12 gal./acre as the seedlings emerge, repeating this 2 or 3 times a week and increasing the amount as the growing season advances. In this way injury to seedlings is avoided. Motorized spray rigs with properly designed booms are essential for a uniform application of the herbicide at a precise rate, and flat, fan-shaped spray patterns are superior to the cone type commonly used for fungicides. Pump pressures of 30–60 lb./sq. m. are best. Considerable savings are being effected by the use of this method of weed control in conifer nurseries, e.g. a total cost of 10–25 cents/1,000 seedlings compared with 75 cents to $1·50 for hand weeding.

2066. STOECKELER, J. H. **Hydrocarbon content and storage period affect toxicity of mineral spirits used as selective herbicides for Red Pine nursery beds.** *J. For.* 49 (9), 1951 (647–9). 5 refs.

The kill of weeds obtained by mineral spirit sprays in first- and second-year *Pinus resinosa* seedbeds, varied with their content of aromatic hydrocarbons—the higher the aromatic content, the larger the % of weeds killed. There was a tendency towards a higher % of temporary injury ('oil burn') to the trees given the heavier treatments, but the symptoms had practically disappeared by the end of the season. Considering cost of materials per acre and comparative weed kill, there was a saving of about one-third in the use of the stronger spray. Mineral spirits stored for 14 months caused about 10 times as much damage to the tree crop as fresh materials, presumably because of some chemical changes in storage.

232.327. Protection Measures in Nurseries.

See also Nos. 2058, 2254, 2313.

2067. LANTELMÉ, W. Der Barfrost. **[Soil-lifting frost.]** *Forstwiss. Cbl.* 70 (10), 1951 (628–38). 7 refs. [G.]

Discusses the causes of soil-lifting frost, with particular reference to soil conditions, and describes types of damage done to tree seedlings. Experiments were made in Benneckstein (Harz mountains) to find the influence of certain procedures on such frost damage, and it was discovered that late summer weeding, summer transplanting, soil working in spring, and drill sowing, all increase the risk. No protection is given by a year's growth of weeds, by dressing the soil with lime, or by a previous crop of oats. On the other hand, soil cultivation in autumn and spring transplanting reduce frost danger, while planting mixtures of deep- and shallow-rooted species gives complete protection. Some practical recommendations for nurseries are included.

2068. MEIERHANS, J. *Herpotrichia*-Versuche 1950/51. **[Research on *Herpotrichia nigra* 1950–51.]** *Schweiz. Z. Forstw.* 102 (10), 1951 (526–9). [G.]

Further tests have confirmed the efficacy of dusting conifer buds in mountain nurseries with preparation No. 3979 (manufactured by the CIBA Company of Basel) against infection by *H. nigra*. This is an organic fungicide in the form of a rain-proof dust [cf. *For. Abstr.* 11 (No. 2263)]. Dusting with a sulphur preparation had no effect.

2069. COCKERILL, J., and CAFLEY, J. D. **Damping-off of Red Pine seedlings at Orono, Ont.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (1–2).

Experiments were made on the effect of various fertilizers (N, P, K, and combinations of these) and mulches, on mortality caused by damping-off fungi (including *Fusarium scirpi*, *F. solani*, *F. oxysporum*, and *Rhizoctonia solani*) and on the subsequent growth of surviving trees. Statistical analysis of the results indicates that the chemical treatments applied to seedbeds in this experiment did not produce significant differences in germination or mortality. It was further indicated that, under the conditions of this experiment, seedling beds with a

density of ca. 90 seedlings/sq. ft. will, on an average, be free of damping off, and that a little more than half of any seedlings in excess of this density will succumb. Treatments with peat on the surface of the bed significantly reduced both germination and mortality. It is inferred that the use of peat may offer an insurance of seedling survival under conditions that might be expected to bring about heavy attacks by damping-off fungi.

2070. Cox, R. S. **A preliminary report on etiological and control studies of damping-off and root-rot in the conifer seedbed in Delaware.** *Plant Dis. Reptr.* 35 (8), 1951 (374–8). 3 refs. A.P.B.

Describes experiments to determine the causes of disease in conifer seedbeds at the State Forest Tree Nursery, Delaware. Several fungi were isolated, the most important of which appeared to be *Rhizoctonia solani*. In greenhouse pathogenicity tests all isolates of the fungus seemed to cause pre-emergence damping-off of *Picea abies* and *Pinus strobus*, and post-emergence damping-off of *Picea abies*, *Pinus strobus*, *Pinus taeda* and probably *Pseudotsuga taxifolia*. It also caused typical root-rot symptoms in all these species except *Pinus taeda*. Treatments with chloropicrin (40 gal./acre) were very promising; 40% formaldehyde (435 gal./acre) also gave adequate control. Covering beds of 2-year-old *Pinus strobus* seedlings with laths, both in summer and winter, helped to reduce needle necrosis due to desiccation.

2071. **[Root rot of *Picea glauca* in nurseries.]** *Rep. N.Y. St. Conserv. Dep. 1950*, 1951 (68).

This disease, which had been giving concern for the last two years, and which occurs mainly in 1- and 2-year-old seedbeds but seldom in 3-year-old beds, was studied intensively. The results indicate that it is due to excessive increase in soil fertility caused by the over-use of cover crops. Further studies are to be made to determine the proper cover crops to use to reduce damage from this disease.

2072. Witte, A. **Något om insektsskadegörelser i skogsplantskolor och på skogsfröodlingar. [Damage by insects in forest nurseries and seed plantations.]** *Svenska SkogsvFören. Tidskr.* 48 (2), 1950 (228–32). 5 refs. [Sw.]

Discusses damage to seed, grafts and seedlings at Ekebo by *Carpocapsa* spp., *Plemeliella abietina*, *Evetria buoliana*, *Melasoma populi*, *Nematus* spp., *Melolontha* spp. and *Agrotis segetum*, with some methods of control.

2073. **[The Mahogany shoot borer, *Hypsipyla albipartalis*.]** *Rep. For. Dep. Uganda 1950*, 1951 (17).

This insect causes considerable damage to nursery seedlings and transplants of *Khaya grandifoliola* and *K. anthotheca*. It can be almost completely controlled by shading, but the erection and maintenance of artificial shade in nurseries is costly. Experiments are being started to see if Figs, planted as stakes, will provide cheap and adequate shade.

232.328. Vegetative Propagation.

2074. Castro, C. **Propagación vegetativa del cedro. [Vegetative propagation of Cedar.]** *Agric. trop., Bogotá* 7 (9), 1951 (49–51). [Span.] A.P.B.

Describes successful attempts made at Villavicencio, Colombia, to propagate Cedar [*Cedrela* sp.?] from ordinary cuttings, without the use of growth-promoting substances. The cuttings were ¼–2 in. in diameter and about 1·2 m. long; thicker cuttings should be longer. After 4 months some of the cuttings had shoots 1·7 m. high. The author concludes that this would be an admirable species for hedges and windbreaks.

2075. Dijkman, M. J. **A commercial method for the propagation of *Strophanthus sarmentosus*** A.P.D.C. *Amer. J. Bot.* 37 (8), 1950 (623–8). 17 refs. O.B.D.

S. sarmentosus was successfully propagated in open-air beds in Florida from leaved 2- to 3-node branch cuttings, which were kept under a fine water spray until the axillary buds showed activity.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See also Nos. 1800, 2107–9.

2076. **Fabricación de macetas de barro crudo. [The manufacture of unbaked mud pots.]** Ministerio de Industria y Comercio de la Nación, Combustibles, Vegetales y Derivados (E.N.D.E.), Dirección de Agronomía, Departamento Forestal, Buenos Aires. 1950. pp. [14]. [Span.]

Describes a method of moulding rough hexagonal pots of mixed mud and straw for planting out *Eucalyptus* seedlings. The advantage of such pots is their cheapness, the relatively small space they occupy in storage in comparison with round pots, and the fact that they can be left *in situ* when planting out. Costs of manufacture by hand and by machinery are presented.

2077. Singhal, R. M. **The *dona* technique of raising Teak seedlings.** *Indian For.* 75 (11), 1949 (1951), (447–8 + 1 photo).

Seedlings are transplanted when 8–10 days old into *donas* or leaf cups made from leaves of *Bassia latifolia*, *Butea frondosa* or *Diospyros tupru*. Each *dona* is ca. 5 in. in diameter and 7 in. deep and has a perforated bottom. Seedlings that are just developing secondary roots from the radicle do better than those with a developed root system. The *donas* are put on bamboo platforms 1½ ft. from the ground and kept covered from 10 a.m. to 4 p.m. with a thin mesh of bamboo 10 ft. from the ground. They are watered morning and evening with a fine spray. After 2–4 weeks, when the plants are ca. 3 in. high and have 6–8 pairs of leaves, they are pit-planted in the forest after a good rain without being removed from the *dona*. The cost of raising this type of transplant is Rs.3/100 compared with Rs.1·12/100 for root-and-shoot cuttings, but survival is better, especially during drought.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 2009, 2015, 2045–6, 2059, 2088.

2078. Logan, K. T. **Seed-spotting in a cut-over Jack Pine stand.** *Silv. Leafl. For. Br. Can.* No. 57, 1951. pp. 2.

Jack Pine stands usually occur on dry, medium-quality sites, which are difficult to regenerate. Experimental spot sowing of Red, White, Jack and

Scots Pine was done on a clear-cut site of this kind. Sowing was done in mineral soil at a 6 × 6 ft. spacing. Survival of Red and White Pine was poor and it is apparent that these species require some shelter in their early years.

Jack Pine showed best growth (12 in./ year compared with 6 in. for Scots Pine and 1·2 in. for Red Pine). It is concluded that spot sowing could be successfully used either to regenerate Jack Pine on a clear-cut, medium site, or to convert the area to Scots Pine.

2079. SIDORENKO, A. T. Letnie posevy sosny. **[Summer sowings of Scots Pine.]** *Lesn. Hoz.* 3 (7), 1950 (79). [Russ.]

In the Gomel Province of the Belorussian S.S.R. sowing of Scots Pine in very early spring gives the best results. Later spring sowings are apt to show high losses from the droughts which are frequent at this time of year. The summer months, however, are generally rainier, and in a series of trials made in 1948 it was found that weeded but unwatered sowings made as late as August 1st and 10th gave a plant % of 58–63 and a mortality by 15 September of 11–13%. These seedlings, although making little growth by autumn, came through the winter well and grew on vigorously to form good 2-year-old plants by the autumn of 1949.

2080. LEGANCEV, M. I. Razvedenie bereskleta v specializirovannom hozjaistve. **[Raising *Euonymus* in a specialized plantation area.]** *Lesn. Hoz.* 3 (7), 1950 (73). [Russ.]

Gives brief notes on the beginnings of plantation trials of *E. europaeus* and *E. verrucosus* in the Plavsk plantations. It is noted that September sowings of fresh, unstratified seed of *E. europaeus* gave much better results than spring sowings of stratified seed.

232.4. Formation of Stands by Planting

See also Nos. 2036, 2046, 2127, 2153, 2160, 2176.

232.41. *Planting Stock (Type, Handling and Treatment)*

See also Nos. 2007, 2076–7, 2084, 2107–9.

2081. RAKOEN, M. P. Tabellarisch overzicht van de beste afmetingen van stumps van een aantal houtsoorten en groenbemesters. **[Tabular review of the best dimensions for stump-plants of a number of trees and green-manure crops.]** *Rapp. Bosbouwproefsta., Bogor* No. 47, 1951. pp. 18. [Jav.Du.]

Gives tabulated data showing time of planting, dimensions (root/shoot length, and diameter), method of planting, % of success, and average height growth for 104 species. Legends and comments on the table are in Javanese only, but a list of the main terms in both languages is given.

2082. GLUCKII, I. I. Letnjaja prikopka sejancev. **[Summer heeling in of seedlings.]** *Lesn. Hoz.* 3 (7), 1950 (75–7). [Russ.]

Since the two periods of most active root growth, viz. spring and autumn, do not coincide with the summer period of most active shoot growth, it should be possible, by summer lifting and heeling in of seedlings, to retard the growth of shoots and stimulate that of the roots, thus producing planting stock better balanced in this respect. In 1949, in the Irpensk forest, the author tried lifting and heeling in at intervals of 10 days throughout August and September, using Scots Pine and Oak seedlings from spring sowings of that year and Norway Spruce seedlings of the previous year's sowings. These were heeled in vertically in trenches filled with leaf-mould, peat and sand, or sand with rotted manure and nursery soil; three to 10 waterings followed. Trials were made (1) on low-lying land near a reservoir and (2) in the nursery itself. Results were checked on 20 November, 1949. In (1) no shoot growth and very little root growth had occurred, and the Pine on one plot, which was given 10 waterings, all died. In (2) there was some shoot growth and considerable root growth in all species, and all had shorter, bushier root systems than controls. The best results were given by seedlings heeled in on 7 August at a density of 5,000 plants/sq. m. in the leaf-mould/peat/sand mixture. Some results for Pine are tabulated to show that in addition to a higher root/shoot ratio (1 : 2 vs. 1 : 3, based on [dry?] weight), the heeled-in stock also had a total weight per plant 1½ times that of the controls.

2083. MEŠČERIN, JA. Opyt letneĭ podsadki lesokuljtur. **[Experiment on the beeting up of [Pine] plantations in summer.]** *Lesn. Hoz.* 3 (7), 1950 (77–8). [Russ.]

In the southern forest-steppe zone it appears impossible to avoid beeting if plantations are to be satisfactory. The author briefly describes [with no quantitative data] his observations on the results of beeting operations, chiefly in Pine plantations, undertaken in the Zolotonoshsk forest in July, 1949, a month in which blanks have become evident and the weather is usually rainy. Three kinds of stock [age unspecified] were used: (1) seedlings lifted in spring from the nursery and heeled in near the planting site; (2) wildings lifted with balls of earth; (3) seedlings direct from the nursery. Best survival was shown by (1), a result attributed to the roots having recovered from lifting damage during the period of heeling in, and suffering no comparable damage on re-lifting for planting. In spite of their earth balls, (2) all died, probably because of the sudden change from forest to open conditions. Survival of (3) was fairly good in cases where lifting and planting out were done in overcast weather after rain.

232.42. *Methods of Planting (including Use of Fertilizers etc.)*

See also No. 1800.

2084. MORK, E. Akkordplanting, planteavstand og plantealder for gran. **[Piece-work planting, planting distances and plant ages for Spruce.]** *Tidsskr. Skogbr.* 57 (2/3), 1949 (81–9). [Nor.]

Planting by piece rates generally gives more economical results than work at day rates. Planting cords with marks at intervals of 1·5 m. have been used to ensure that planting is not too close. Results of planting trials using these cords are tabulated, showing for the different planting methods, the number of plants set out daily by adults and by boys and girls, the average plant loss during the first

summer, and costs. Crowbar planting is shown to be cheapest, and flat-root planting the most expensive. Mortality was lowest and highest among plants planted by the quickest and slowest workers respectively. The average mortality for plants planted by boys and girls under 17 was 10% and for those planted by adults 9·56%. A graph is given showing the relationship between costs and planting distances. A series of trials has been laid out for Spruce planted at distances of 1·4, 1·6, 1·8, and 2·0 m. In the meantime, a planting density of 400 plants per dekare on the best lowland site classes is recommended. For sites covered with taller vegetation, 5-year-old or the larger 4-year-old plants are recommended, and, for sites with lower vegetation the smaller 4-year-old plants. Two-year seedling plants are recommended only for sites that are suitable for natural regeneration.

2085. CLASON, M. S. Litt om planteteknikk og planting på akkord. [**Notes on planting technique and piece-rate planting.**] *Tidsskr. Skogbr.* 57 (4), 1949 (112–5). [Nor.]

Discusses briefly planting methods and some ways of checking the number planted in piece-rate work.

2086. BOGESS, W. R. **Fall planting studies with Pine in southern Illinois.** *For. Note Ill. agric. Exp. Sta.* No. 25, 1951. pp. 6.

In the first planting series, results of planting 1+0 Shortleaf Pine by the bar-slit and the mattock-scalp methods at the same date and in the same ground cover, were compared. The bar-slit proved significantly better, with 87·1% survival against 62·6%; mortality from frost-heaving was respectively 24 and 28·8% of the original number of plants. In the second series, results were compared for planting 1+0 Loblolly Pine on 15 October, 28 October, 11 November, and 4 December on two sites, one with a cover of broomsedge (*Andropogon* spp.) and the other predominantly of poverty grass (*Aristida dichotoma* and *Danthonia spicata*). Survival decreased with the later planting dates, ranging from 94 to 65% on broomsedge, and from 96 to 40% on poverty grass. The survival of stock planted on 4 December was significantly below that on the earlier dates, and the differences in survival on the two types of cover were only significant for the 4 December planting. Frost-heaving was not a significant cause of mortality. Results are tabulated.

2087. MCDERMOTT, R. E., and BURNS, P. Y. **Effect of fertilizer on planted Pine.** *J. For.* 49 (9), 1951 (633). [Department of Forestry, University of Missouri.]

In the spring of 1949, 1+0 stock of *Pinus banksiana* was planted at 5 × 5 ft. in an abandoned field in central Missouri to test the application of various fertilizers. The fertilizers used, with amounts on a per-acre basis, were: 2 tons lime, 300 lb. NH_4NO_3, 200 lb. 0–20–20 (N–P–K) and 500 lb. rock phosphate. The treatments used were: (1) no fertilizer; (2) lime, nitrate, 0–20–20, and rock phosphate; (3) same as (2) minus lime; (4) same as (2) minus nitrate; (5) same as (2) minus 0–20–20; (6) same as (2) minus rock phosphate. The fertilizer was applied broadcast to the soil surface at the time of planting. After 2 growing seasons, a survey of survival and growth was made. Survival % was (1) 88, (2) 39, (3) 30, (4) 80, (5) 58, (6) 33. The high mortality on plots receiving N was apparently due to the dense growth of tall weeds. The data also indicated that the presence of K and P in the 0–20–20 fertilizer adversely affected survival, probably because the P helped the weeds more than the Pine. Application of fertilizer did not significantly increase height growth. [Cf. *For. Abstr.* 3 (p. 21).]

2088. KLÆBO, K. Skogplanting med maskin. Maskinplanting utført på Forsetmoen i Troms 1949–1950. [**Forest planting by machine. Machine planting on Forsetmoen i Troms 1949-50.**] *Tidsskr. Skogbr.* 59 (4/5), 1951 (145–56). 9 refs. [Nor.]

Describes the Lowther and the Badger planting machines [cf. *For. Abstr.* 10 (No. 2563)]. The Badger was used on a planting area with a typical podzol profile, having 10–15 cm. of raw humus below a thick layer of moss with some heather. The area, felled in 1948–49, had a number of undecayed stumps. The planting machine was unsuitable for this kind of site; the coulter failed to cut cleanly through the top layer of moss and raw humus, and the machine was not sufficiently strongly built to cut through stumps and was too easily lifted, giving a shallow furrow. In 1950, this planting machine was used on land already ploughed by a Badger plough. This plough was strong enough for the conditions on the site, was not easily lifted, and ploughed 75 dekares in 2 days, giving furrows 10–15 cm. deep. The planting machine gave satisfactory results in these furrows, averaging 15,000 plants a day, maximum 18,000. Possible disadvantages are that some trees are inevitably planted in hollows where water is likely to collect, with risk of frost damage, and that plant nutrients are removed with the raw-humus layer. The planting machine, in its present form, is not suitable for Norwegian conditions, but strengthening, especially of the coulters, might make it so. Sowings also were made in and between furrows in a Badger-ploughed area. In the unusually dry summer of 1950, seeds germinated only in the furrows, but in normal seasons germination would probably have been equally good on the ridges. Seedlings appear healthy, but there is again the danger of water collecting in the furrows.

232.43. *Spacing and Arrangement in Plantations*
See also Nos. 2084, 2153.

2089. VANSELOW, K. Einfluss des Pflanzverbandes auf die Entwicklung reiner Fichtenbestände. II. [**The influence of spacing on the development of pure Spruce stands. II.**] *Forstwiss. Cbl.* 69 (9), 1950 (497–527). [G.g.]

The gist of this article, the first part of which appeared in 1942 [*Forstwiss. Cbl.* 64 (23–37; 49–59)], is summarized in *Forestry* 24 (2), see next abstract.

2090. GUILLEBAUD, W. H. **Norway Spruce spacing plots at Wessling, Bavaria.** *Forestry* 24 (2), 1951 (121–6).

The paper discusses the results obtained to date from a unique series of Norway Spruce spacing plots

established in 1910 in Bavaria. There is a series of ten plots covering initial spacings ranging between 3 ft. 7 in. and 6 ft. 7 in., and an eleventh plot, spaced at just over 13 ft., and interplanted 6 years later at 3¼ ft. × 3¼ ft. The plots have only been twice thinned and have suffered no windfall in spite of their rapid growth.

The results of the latest assessment by Prof. Vanselow, in 1949, have been summarized in a recent German forestry journal, and in the present paper extracts from Vanselow's data have been converted into English units.

Although spacing has had no apparent effect on height growth, other factors such as g.b.h., form of stem, branching, and average volume per tree, show the expected response to increased spacing. There is some indication of a reduction in total yield to date with increasing spacing in the main series of plots. The plot spaced at 13 ft. has many features of special interest, *inter alia* the death by suppression of 97% of the plants used to fill up.

Vanselow concludes that the optimum initial spacing for Spruce on similar sites lies within the narrow range of 4 ft. 6 in. and 5 ft. 3 in. This accords closely with current U.K. Forestry Commission practice. *Author's summary.*

2091. ANDERSON, M. L. **Spaced group-planting and irregularity of stand-structure.** *Emp. For. Rev.* 30 (4). 1951 (328–41 + 26 photos). 14 refs.

The present position respecting a number of experiments with a system of planting by dense groups, widely spaced, which were established in Scotland and the north of England in the years 1929–32, is reported upon, with reference to a series of photographic illustrations taken in 1950. Earlier claims concerning advantages of such a system are discussed in the light of what these experiments now show. Expected disadvantages are similarly dealt with, as are new advantages which have emerged. The similarity of the method to the Russian method of 'nest' sowing or planting is briefly considered.

In general it is concluded that results are very promising and that the system is deserving of extensive trial under a variety of conditions. Suggestions as to the form such trials might take are offered.

It is considered that the system is a plastic one and well adapted to lead to the formation of stands, irregular in composition and age, which in certain circumstances are for several reasons to be preferred to those regular stands which derive from even-aged orthodox plantations. *Author's summary.*

232.44. *Season and Time of Planting*

See Nos. 2083, 2086.

233. *Afforestation*

See also Nos. 1830, 1842, 1940, 2028–30, 2043, 2158, 2161, 2176, 2649 *et seq.*

2092. BRENAC. Exposé sur les résultats des reboisements de la forêt domaniale de Verdun, fait au Monument Maginot (au pied du Fort de Souville). **[Results of afforestation of the state forest of Verdun.]** *Bull. Soc. for. Franche-Comté* 26 (3), 1951 (93–8 + 3 photos). [F.]

The Verdun Forest covers 9,300 ha. of the former 'Zone rouge' at Verdun, of which 66% was originally agricultural land and 34% forest.

2093. ZOLJOMI, B. Fitocenozy i lesomelioracii obnaženiĭ gor Budy. **[The phytocoenoses of the mountains of Buda, and the afforestation of denuded areas.]** *Acta Biologica, Budapest* 1 (1/4), 1950 (7–67). [Russ.f.]

Analyses the plant associations of the 300–500 m., dolomitic and limestone hills to the west of the capital, in particular the grass associations on deforested areas and the neighbouring forest associations. Forest has a much more precarious hold on the dolomitic than on the limestone areas, so that both afforestation and the maintenance of forest need special care on the former. The plant associations are grouped according to their suitability for afforestation in the following, descending, order: I—secondary grass associations, formed where forests have disappeared (*Brachypodium pinnatum*/*Cytisus nigricans*, *Bromus erectus*/*Festuca sulcata*, *Festuca sulcata*/*Avenastrum pubescens*, and *Poa pratensis* subsp. *angustifolius*); II–III—the *Festuca sulcata* association; III—the *Carex humilis* association; III–IV—the *Bromus erectus* and *Sesleria budensis* associations (but the rocky facies of these two cannot be afforested); and V—the *Festuca glauca* association and the *Stipa pulcherrima* sub-association, in which only the less exposed sites with better soils are suitable for afforestation. Trees recommended for planting such areas are *Quercus pubescens* (*Pinus nigra* should be held in check) with *Fraxinus ornus*, *Prunus mahaleb*, and *Sorbus* spp. as auxiliary species; *Tilia platyphyllos*, *T. pseudorubra*, *T. caucasica* and *Acer platanoides* for northern slopes; and *A. campestre*. Protective shrubs recommended are *Cornus mas*, *Rhus cotinus*, *Euonymus verrucosus* and *Viburnum lantana*. *From author's summary.*

2094. ČEVEDAEV, A. A. Datj mesto bereze v stepnyh lesokulʹturah. **[Give Birch a place in steppe plantations.]** *Lesn. Hoz.* 3 (7), 1950 (36–9). [Russ.]

Tabulates a few figures indicative of the climate of 3 forests, in Saratov, Stalingrad and Rostov provinces, respectively, and the average quality class of Oak, Birch (*Betula verrucosa*), Pine and Aspen stands in each of them, to show the superior productivity of Birch and the low productivity of Oak compared with the other species. Quotes also some data from a block of forest 600 m. wide and 463 ha. in area, established more than 50 years ago on a high steppe ridge between the rivers Medveditsa and Tersa, Stalingrad Province. This forest contained various mixtures of species, but by 1949 almost all had been felled owing to death of the trees. Two good strips remain, both containing Birch. A sample plot in one of these showed the upper storey to consist entirely of Birch of mean diameter 32 cm. and mean height 17–18 m., quality class I–II, with Elm, Norway Maple, and Oak in the lower storey, which had a mean diam. of 15 cm. and a mean ht. of 10–12 m. The crown density was 0·9 and the volume/ha. 225 cu.m. The Birch was straight, with healthy, well developed crowns. It is stressed that though this example might represent suppression of Oak by the Birch, the former species

did poorly over the whole area in other types of mixture. Birch has also the advantage of tolerating a fair degree of soil salinity (up to 0·09% Cl′ and 0·39% SO″). If the physical and mechanical properties of steppe Birch wood are found to compare favourably with those of Oak—as suggested by a tentative comparison of some figures for these species in other regions of the U.S.S.R.—it ought to take first place in steppe plantations.

2095. CHRISTODOULOPOULOS, A. Anadasōseis. [Reforestation [in Greece].] *Dasos* No. 4, 1947 (3–10). [Gk.]

The author (Director of Forestry) estimates that 45% of Greece was forest when the country was freed from Turkish rule; by 1940, only 15%. During World War II some 5 million stremmas (1 stremma = 1000 sq. m.). of forest land, mostly accessible, were destroyed. Reforestation started seriously in 1945, with home-grown and imported seed, the major work being concentrated in Attica, especially near Athens. Armed forces, police, firemen and other public bodies, and also students, supplemented the work of forest organizations. Both pit sowings and transplants were used of a wide variety of species, e.g. *Pinus halepensis, Cupressus* spp., *Eucalyptus* sp., *Robinia pseudoacacia, Acacia cyanophylla, Ceratonia siliqua, Populus* and *Quercus* spp., *Casuarina* sp. In 2 years ca. 10,000 acres were planted up in Attica and about the same area over other parts of the country, including Macedonia, with successful results. In 1947 large-scale reforestation was extended to Salonika and Ioannina. New state forest nurseries now number 50, one at Kouponea being over 100 stremmas in extent, with a potential of 30–40 million plants p.a.

2096. KARSCHON, R. Le choix des essences pour les reboisements en Israel. [The choice of species for afforestation in Israel.] *Schweiz. Z. Forstw.* 102 (10), 1951 (479–90). 6 refs. [F.g.]

2097. KING, N. L. **Tree-planting in S. Africa.** *J. S. Afr. For. Ass.* No. 21, 1951 (1–102 + 4 maps). [E.]

An entire number of the journal is devoted to this treatise on afforestation, including choice of species, selection of sites, establishment and maintenance of plantations, yields, shelterbelts, hedges etc. A series of appendixes give rainfall, topographical maps, and suitable species for trial in different parts of the Union. There are many illustrations.

2098. [STEPHENS, P. R.] **Farming in Canterbury.** *N. Z. J. Agric.* 82 (1), 1951 (15–26). A.P.B.

Includes a brief history of afforestation in Canterbury during the years 1900–1920.

2099. PENDLEBURY, C. L. **Mineral spoil heaps: experimental planting.** *J. Land Agents' Soc.* 50 (11), 1951 (472–4).

Notes on small-scale experimental plantings made in 1947 on spoil mounds on the St. Aubyn estate in Cornwall. The experimental area was fenced against rabbits, and planting was done in pits spaced 5 × 5 ft., using *Pinus radiata* (ball plants), *Cupressus macrocarpa, Chamaecyparis lawsoniana* (small transplants), *Thuja plicata, Larix decidua, L. leptolepis* and *Pseudotsuga taxifolia* (large transplants), *Fagus sylvatica* and *Acer pseudoplatanus* (small transplants). *Pinus radiata* was much the most successful and the whole area has been beeted with this species. Earlier plantations of *P. radiata* made ca. 30 years ago on spoil mounds have done well, and would have done better had they been thinned earlier. They have made about twice the height growth of Chestnut and Beech planted at the same time.

2100. EVANS, W. D. D. **Afforestation of waste-land.** *J. Land Agents' Soc.* 51 (1), 1952 (43–4).

Describes the successful afforestation of spoil from sand and gravel works with Sitka Spruce and unrooted cuttings of *Populus robusta*.

2101. LÖHR, T. Zum Thema: Aufforstung von Anschüttungsböden. [The afforestation of spoil mounds.] *Forst u. Holz* 6 (19), 1951 (279–81). 14 refs. [G.]

A discussion of suitable species and methods with special reference to Germany. In trials begun in 1944 in the Brühl administrative district the author obtained good results with *Populus regenerata*, Harff strain (6 × 6 m.), interplanted with *Alnus glutinosa* (2 × 2 m.). The use of 2-year-old (on unfavourable sites even 3-year-old) plants is recommended. Attention must be paid to the provenance of the Poplars, the choice of suitable strains being very important. [Cf. *For. Abstr.* 12 (No. 297).]

2102. DUBJANSZKIJ [DUBJANSKIĬ], V. A. Erdötenyészeti feltetelek a Don homokos terraszain. [Conditions necessary for afforesting the sandy terraces of the Don.] *Erdész. Lap.* 86 (7), 1950 (211–7). [Hung.f.e.] Transl. into Hungarian of a paper in *Les i Stepj* 1949 (3).

Mainly a dissertation (illustrated) on the deposition of sand particles and the physical and chemical changes which these undergo from wind pressure and their interactions with colonizing plants; all with particular reference to the sands of the Don basin where, the author observes, 90 years' afforestation, chiefly with Scots Pine, has achieved very little. Despite a permanent moist stratum ca. 1 m. below the surface, the low nutrient status of these sands allows only Scots Pine to be grown, plus Birch if the water table is not deeper than 1·5–2 m. [Cf. *For. Abstr.* 12 (No. 1957).]

2103. BASU, S. K. **Anti-erosion work in Kalimpong forest division.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (208–12).

Describes methods of gully plugging and planting to prevent gully erosion and landslides on unstable slopes. A small tufted Bamboo known locally (in Bengal) as *amlisho*, which grows in thick clumps and takes root quickly, is useful for stabilizing new landslides. Two very hardy, quick growing species, easily raised by direct sowing on new ground are *Alnus nepalensis* and *Betula cylindrostachys*. *Cryptomeria japonica* is also useful for covering unfertile ground; survival is good, and though slow for the first 2–3 years, its subsequent growth is rapid. Other useful species on new, unfertile ground are *Bucklandia populnea* and *Cupressus cashmeriana*.

2104. SINGH, K. P. **Anti-erosion work at Barai and Kunwari Bhind district (Gwalior State).** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (216–21).

Report on plantations now 15–20 years old, established in ravines, with comment by *A. P. F. Hamilton*.

2105. MALHOTRA, M. K. C. **Experimental afforestation of denuded hill-side at low elevation (Nurpur-Kangra).** *Indian For.* 77 (12), 1951 (775–81).

Describes the successful afforestation of an eroded hillside by a combination of closure to grazing, gully plugging, and direct sowing and planting. Notes are given on the performance of a number of species used.

2106. KHAN, M. **[Erosion control in western Hyderabad.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (222).

Contour trenching and sowing with *Acacia arabica* and *Melia indica* were not very successful, because the trenching was usually not done along the contours, and because the two species sown were plains and not hill species. Closure to grazing, however, has resulted in a good growth of grass and shrubs.

2107. DASS, B. C. **Fixing sand dunes in Jodhpur State (Rajputana).** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (134–5).

Describes the successful fixation of sand dunes by planting with *Prosopis juliflora*. Seed dropped by domestic animals was sown at the beginning of March in earthen planting tubes 12 in. long and 3 in. in diameter, with one end closed after filling with a mixture of 2 parts ordinary soil to one part night-soil compost. By the end of July seedlings were 15–18 in. high and were planted out in pits 18 in. deep at a 6 × 6 ft. spacing. They were watered till the next rainy season and cleared of sand after storms, and eventual mortality was only 16–22%, mostly due to white ants, rats and drought. After 3 years the planting area was covered by a dense growth of *Prosopis* 10 ft. high and 11 in. in girth at a height of 1 ft.

2108. RAO, S. R. **Tree-planting on the Hagari bank to check sand drift.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (124–7).

Planting began in 1942. So far, the most successful species are *Prosopis juliflora*, *Albizzia lebbek* and *Inga dulcis*, in that order. *Casuarina equisetifolia* does fairly well in favourable conditions, but is not as windfirm as *Prosopis* or as dense as *Inga*. It was found that one result of closing experimental areas to grazing was to bring in much natural regeneration of *Acacia arabica* from seed left behind where sheep had been penned. Seed of this species is now sown between planted rows of *P. juliflora*, *A. lebbek* and *I. dulcis*, whenever possible, by penning sheep and feeding them on pods of *Acacia arabica*. The method of planting that has been found most successful is to raise transplants in earthenware pots without bottoms, about 6 in. in diameter at one end and 4 in. at the other, and plant out direct from the pots. Survival is almost 100%, whereas up to 35% of plants put out with naked roots are lost. Pot plants also need much less watering.

When the scheme began, costs were high (Rs.30 per square chain of planted area) but they have now been reduced to Rs.6. Where cultivation comes close to the river bank, the practice now is to plant a single windbreak, 1–2 chains wide, of *P. juliflora* spaced 12 × 12 ft. with *A. lebbek* in the back row. Where wider tracts of land have already been so covered by sand as to be unfit for cultivation, the usual practice is to plant belts 1–2 chains wide, about 3 chains apart, with a connecting belt every 100 yards or so, and to sow the intervening space with *A. arabica* seed in furrows 15 ft. apart. Where there are sand dunes, tree belts are planted at fairly wide intervals, sets of 'Namal' grass are put out in rows 20–30 ft. apart and *Ipomoea* spp. introduced.

2109. KADAMBI, K. **The Talakad sand dunes in Mysore district.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (128–33).

Outlines the history of the fixation of these dunes (begun in 1892) and describes in detail a new planting technique evolved during 1940–45, for planting out on dry and windy dunes. At 3–4 months old, seedlings are transplanted to unburnt 'bricks' made of a mixture of equal parts by volume of red loam, sand, and cow dung, and dried in the shade. The bricks are 9 in. long, and 6 in. square at the bottom, tapering to 4 in. square at the top. A seedling is planted in a hole 1 in. in diameter and 4–5 in. deep in the top of each brick, and these are put in closely packed rows on nursery beds that have first been covered with a layer of Aloe leaves to prevent the roots penetrating into the natural soil. The rows of bricks are then covered with sand to a depth of ½ in. above their tops to prevent their being washed down by the daily watering. Transplanting into the bricks is generally done in January or February. The sand in the bricks renders them sufficiently porous to enable the root systems of the seedlings to ramify with ease; the cow dung renders them hygroscopic and retentive of moisture besides being an excellent manure, and the red loam provides the requisite mineral nutrients. The seedlings soon fill the entire body of the 'bricks' with their root systems. In August or September the planting bricks with the firmly established and vigorously growing plants are transferred to pits (1 × 1 × 1 ft.) in the sand. The hygroscopicity of the bricks helps the plants over the dry season and obviates the necessity of further watering. If planting is done carefully, this method gives 100% survival in the first year and ca. 90% in the second. Bricks cost Rs.4–5 per 100 compared with Rs.12–15 for pots and Rs.6–8 for earthenware tiles. The use of this technique accounts for the increased success of planting operations, especially of *Casuarina* in recent years.

2110. SINGH, K. P. **[Afforestation of dry areas in Gwalior state.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (150–150*a*).

Describes methods of filling blank patches in the forests of arid parts of the state. Slash is burnt in trenches, the ash mixed with soil heaped up into mounds, and seed sown on the mounds. Protection against grazing and fire are costly, and no cheap and practical method has been developed.

2111. GRIFFITH, A. L. **The Punjab arid area afforestation plots.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (113–7). 6 refs.

Preliminary reports on the 1944 (broadcast sowing) and 1945 (sowing in contour lines) experiments with *Acacia* spp. and *Prosopis* spp.

2112. PRING, N. G. **The afforestation of the dry and desert areas of North West India.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (118–23).

An outline of the problems and experiments carried out mainly in the N.W. Frontier Province.

2113. AFRIDI, K. F. G. **[Choice of species for afforestation of dry areas in the N.W. Frontier Province.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (151–7).

2114. DENUYL, D. **From field to forest—a 50 year record.** *J. For.* 49 (10), 1951 (698–704). 4 refs.

Includes a review of experiments in afforesting old fields in Clark State Forest, Indiana, begun about 1900. These demonstrate that old fields are not suitable sites for planting or direct sowing of hardwoods; the soils have not the organic-matter content, water-holding capacity, or porosity necessary. It is, however, possible to grow a crop of Pine on old fields and at the same time encourage natural succession of hardwoods to eventually restock the area.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 2007, 2023, 2045, 2114, 2179.

2115. CARBONNIER, C. Undervaxtproblemet i kulturbestånd av ek. **[The problem of underwood in artificial Oak stands.]** *Medd. SkogsforsknInst., Stockh.* 40 (1), 1951. pp. 59. 20 refs. [Sw.sw.e.] Price *Kr.*2.

Measurements were made for 30 years on increment cores and felled sample trees for 12 experimental plots in Oak stands, underplanted with Spruce or Beech, at Visingsö. A comparison showed that the basal area (b.a.) m.a.i. from these plots was considerably below that of Oak stands in Denmark, and that the difference increased with increasing age. The volume m.a.i. of the Swedish plots was also inferior. Substantial differences existed in management between the Danish and Swedish stands, and the b.a. of the underwood was much higher in the Swedish stands. From Spruce underwood on 3 plots, calculations based on 1944–8 prices showed a surplus over the cost of cultivation of Kr.431–461/ha. at 2% interest, and Kr.49–32 at 3%, and deficits of Kr.129–188/ha. at 4% interest. Such profits could be offset by an increase in Oak production of 20 cu.m./ha. at the 3% level, and by 50–60 cu.m./ha. at 2%. Studies of annual ring width showed that sparsely planted stands produce wood with annual rings 4–5 mm. in breadth over a long period in the early years of growth; a breadth of not more than 2–3 mm. is desirable for good-quality timber. The b.a. increment of the Oak was shown to decrease with increasing b.a. increment in the undercrop. This was particularly noticeable in the older stands; in stands 100–119 years old, a decrease in growth occurs as soon as the annual b.a. increment of the underwood passes 0·20 sq. m./ha., and in stands 80–99 years old the corresponding figure is 0·35 sq. m./ha.

The following recommendations are made as a result of the study: (1) Underplantings should only be made on very good soils. (2) Very dense underplantings, needing early thinning, should be avoided. (3) Broadleaved species are preferable to Spruce. (4) Underplanting should not be done too early; a suitable time is 50–70 years after the establishment of the Oak. (5) The underwood should be heavily thinned to reduce competition. Spruce or Beech with an average diameter of 10 cm. should not exceed 800–1,000 trees/ha., and those of 15 cm. diameter, 300–500 trees/ha.

2116. LEIBUNDGUT, H. Biologische und wirtschaftliche Bedeutung der Nebenbaumarten. **[The biological and economic importance of secondary species.]** *Schweiz. Z. Forstw.* 102 (10), 1951 (465–70 + 2 photos). [G.f.]

Data are tabulated on the effect of various secondary species (*Tilia* sp., *Ulmus glabra*, *Acer pseudoplatanus*, *Fagus sylvatica*, *Fraxinus excelsior*, *Alnus incana*, *Betula pubescens*, *Quercus robur*) on the pH of soils in Spruce stands. Figures are also given of diameter increment and increment %, of these and some other secondary species, compared with similar figures for the more important conifers. Assortments produced by these secondary species in an experimental forest are analysed.

2117. LAMPRLCHT, H. Verbreitung und waldbauliches Verhalten einiger Nebenbaumarten im schweizerischen Mittelland. **[Distribution and silvicultural character of some secondary species on the Swiss plateau.]** *Schweiz. Z. Forstw.* 102 (10), 1951 (470–5). [G.f.]

2118. LEIBUNDGUT, H. Nachzucht und Erziehung der Nebenbaumarten. **[Natural regeneration and silvicultural treatment of the [principal] secondary species [in Switzerland].]** *Schweiz. Z. Forstw.* 102 (10), 1951 (475–9). [G.f.]

Deals briefly with Oak, Ash, Alder, Cherry, Birch and Aspen.

2119. SKOG, R. E. **Growth of mixed Red and White Pine plantations in the upper Peninsula [,Michigan].** *Quart. Bull. Mich. agric. Exp. Sta.* 34 (1), 1951 (30–4). 5 refs.

Discusses the data derived from measurement of 25-year-old experimental plantations of *Pinus resinosa* and *P. strobus* in alternate line mixtures. *P. resinosa* has done well, but *P. strobus*, partly as a result of weevil attacks, is becoming suppressed and slowing down in diameter growth. This suppression of the White Pine is serving the same purpose as thinning, so far as the Red Pine is concerned.

2120. MUNTZ, H. H. **Converting scrub Oak areas to Pine plantations.** *J. For.* 49 (10), 1951 (714–5).

Loblolly, Slash, and Longleaf Pines were planted in Oak scrub and released at different times and by different methods [cf. *For. Abstr.* 12 (No. 2945)]. It was established that this process of conversion can be done successfully, provided that release is not deferred long after planting.

2121. McQUILKIN, W. E. **Weed killers of limited use in reforesting scrub Oak barrens.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 6, 1951. pp. 4.

In experiments over a period of 3 years, 2,4-D and 2,4,5-T in concentrations of 0·6% and less, Atlacide (a $NaClO_3$ preparation), oil solutions, and Weedone Brush Killer 32, failed to kill scrub Oak and associated species. Ammate at 2 lb./gal. and stronger concentrations, killed or drastically weakened scrub Oak and many species commonly associated with it. However, Ammate is expensive, and planting trees in standing Oak brush killed by chemicals is slow and difficult and likely to be unsatisfactory.

2122. McQUILKIN, W. E. **Bulldozer better than poisons for preparing scrub Oak planting sites.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 7, 1951. pp. 4.

Field tests on 47 acres in 1950 showed that site preparation by furrowing with a bulldozer can be done at reasonable cost. Disadvantages are that the area is left very rough, that the topsoil is pushed aside and the trees are planted in the clayey subsoil, and that furrows may cause run-off, gullies and silting of streams.

2123. **[Experimental planting in forest reserves.]** *Rep. For. Dep. N. Borneo 1950*, 1951 (9).

Small-scale experimental plantings of several indigenous and imported species were continued in two forest reserves. Seedlings of *Cola acuminata* did well at first but were seriously damaged by leaf-eating insects. Balsa (*Ochroma lagopus*) raised from locally produced seed was seriously browsed by deer, from which injury it generally does not recover. *Melaleuca leucadendron* continued to flourish despite trampling by wild cattle; average height at 2 years was 10 ft.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

See also Nos. 2083, 2250.

2124. JENSEN, V. S., and WILSON, R. W. **Mowing of northern hardwood reproduction not profitable.** *Ntheast Res. Note Ntheast. For Exp. Sta.* No. 3, 1951. pp. 4.

The slightly higher quality of saplings and the increased stocking (2,400 per acre versus 700 on an untreated plot) on a plot where all stems 6 in. and less in diameter had been mowed down with axe and brush scythe 16 years earlier, was not considered to justify the expenditure of 9–13 man-hours/acre. Girdling worthless residual trees to give the young trees more room, increased the stocking almost as much, and took only 4–5 man-hours/acre.

237. *Amelioration of Forest Sites*

See also Nos. 1809–10, 2023, 2142.

2125. NĚMEC, A. **Hnojení lesních kultur: meliorace krnících kultur a porostů. [The manuring of forest plantations: amelioration of checked plantations and stands.]** *Sborn. výzkum. Úst. lesn. ČSR* No. 3, 1950. pp. 437. 305 refs. [Cz.cz.russ.e.]

The first part of this monograph summarizes research to date, in Czechoslovakia and elsewhere, on the use of mineral fertilizers, peat or raw humus, mulching with plant residues, and growing leguminous plants such as perennial lupin or Broom (in combination with mineral fertilizers), and auxiliary soil-improving woody species, to improve degraded forest soils under Scots Pine (pp. 6–74), Norway Spruce (pp. 75–113), other conifers—viz. *Abies alba*, *Larix decidua*, *Pinus nigra*, *P. strobus*, *P. banksiana*, *Pseudotsuga taxifolia* and *Picea sitchensis* (pp. 114–38), and hardwoods—viz. Beech, Oaks (*Quercus robur* and *Q. borealis*), Ash, Elm, Lime and Birch (pp. 138–64).

The second part deals with the results of trials made by the Institute of Forest Biochemistry and Pedology, Prague, to discover the most suitable methods of fertilizing plantations on different types of degraded forest soils, viz. azonal soils (pp. 166–200), podzolized brown forest soils (pp. 200–9), podzols (pp. 209–21), podzols with hardpan (pp. 221–99), gleys (pp. 300–79) and gley podzols (pp. 380–96), the treatments discussed being (1) liming plus artificial fertilizers, (2) liming, artificial fertilizers and growing perennial lupin, and (3) fertilizing with crushed basic eruptive rocks.

There is a 20-page Czech summary besides the briefer summaries in Russian and English.

2126. BERG, E. Gjødsling av myr. **[Manuring [drained] peat bogs.]** *Tidsskr. Skogbr.* 57 (1), 1949 (7–9). [Nor.]

No regeneration took place within 10 years on an area of peat bog drained in 1933. In 1943 and again in 1944, the area was treated with 50 kg. complete fertilizer per dekare. Within 5 years, Pine and Birch plants 1·5–2·5 m. tall were abundant and there were some Spruce plants. On a similar area treated in 1946 and again in 1948 with 20 kg./dekare, regeneration was also satisfactory. Treatment with $Ca(NO_3)_2$ alone, had no effect. [Cf. *For. Abstr.* 13 (No. 1810).]

238. *Timber Plantation Crops requiring Special Treatment*

See also Nos. 1919–20, 2708.

2127. LÜCKE, H. Pappel-Pflanzenzucht und -Anbau. **[Poplar propagation and the establishment of Poplar plantations.]** M. & H. Schaper, Hannover. 1951. pp. 54 + 16 plates. 21 refs. [G.] Price *DM*4·40 [8*s.* 0*d.*]

A practical guide to nursery work (propagation by seed, root suckers and cuttings; tending; and diseases and pests of nursery stock) and planting (choice of site and variety, planting methods, spacing and early tending), with chief reference to the hybrid Black Poplars.

2128. GIORDANO, G. Le peuplier. (Une essence industrielle de grande valeur). **[Poplar. (An industrial species of high value).]** *Rev. Bois Appl.* 6 (9/10), 1951 (25–8) [F.]

Discuss the problems of Poplar-growing in the Po valley and the origin of tension wood.

24. TENDING OF STANDS AND TREES

See also Nos. 2021–2.

242. *Thinnings*

See also No. 2203, 2220, 2341, 2361.

2129. **The thinning of plantations.** *For. Oper. Ser. For. Comm., Lond.* No. 1 (2nd ed.) 1951. pp. 40.

The principal change since the 1st ed. [cf. *For. Abstr.* 7 (No. 1783)] is the addition of a table for Beech.

2130. LINDQUIST, B., and PETRINI, S. Produktionsförluster i nutida svenskt skogsbruk. [**Production losses in Swedish forestry today.**] *Svenska SkogsvFören. Tidskr.* 48 (3), 1950 (241–51). [Sw.]

Reviews literature on the effect of thinning frequency on total output, and quotes figures to show that reduction of the thinning interval will increase total production as follows: from 10 to 5 years, up to 4·2%; from 15 to 10 years, up to 12·5%; and from 15 to 5 years, up to 17·3%. Figures drawn from the second state survey show that the thinning interval in N. Sweden is up to 25 or 30 years, and in S. Sweden up to 10 years. Ten years is recommended as the maximum interval for N. Sweden, 6 for central Sweden and 5 or less for S. Sweden. It is estimated that these reductions would give increases in production varying from 4 to 12%, equivalent to from 0·1 to 0·4 cu.m. yearly per ha., or 5 million cu.m., valued at Kr.70 million for the whole country. Some problems relating to the treatment of poorer-quality stands, the period before a return could be expected, and the disposal of thinnings, are discussed rather generally.

2131. GRIFFITH, A. L. [**Thinning research in India.**] *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (594–7).

Brief analysis of progress since 1939.

2132. PRASAD, J. [**Thinning research.**] *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (597–602).

Critical observations on Indian practice under the heads: tree classification, objects, types of thinning, methods of assessment, and design of thinning plots. A combination of direct observation and statistical analysis is recommended.

2133. GAINES, E. M. **A Longleaf Pine thinning study.** *J. For.* 49 (11), 1951 (790–2).

A 15-year study in second-growth stands averaging 22 years old in 1934; three thinning intensities.

243. *Opening of the Canopy (Increment, Overhead Release and Improvement Fellings)*

See also Nos. 2002, 2005, 2120–1, 2124, 2185–90, 2248 *et seq.*

2134. MARRERO, J., and WADSWORTH, F. H. **Early results from the improvement of a farm woodlot.** *Carib. For.* 12 (2), 1951 (59–66). [E.Span.]

Yearly improvement fellings were begun in 1944 in a worked-out stand situated in the St. Just Experimental Area, Puerto Rico. Data are presented on its development, and on the returns obtained, compared with neglected stands.

2135. SMITH, F. F. **A tool for applying ammate crystals.** *J. For.* 49 (10), 1951 (735–6).

Describes (with diagrams) a tool developed on the Fayette Experiment Forest, Alabama, for application of Ammate crystals. It consists of a cylindrical chamber in which a tablespoonful of crystals is picked up, and a plunger which pushes the crystals from the chamber into a previously chopped cup in the tree to be poisoned. Use of the tool instead of a spoon saves half the time for applying the poison and also saves loss of Ammate by spilling.

2136. CHAIKEN, L. E. **Chemical control of inferior species in the management of Loblolly Pine.** *J. For.* 49 (10), 1951 (695–7).

A short account of experiments in N. Carolina in the application of 2,4-D, 2,4,5-T, and Ammate to undesirable hardwoods by (1) foliage sprays (considered of limited use), (2) application to cut surfaces, (3) basal (bark) sprays (considered most promising). [Cf. *For. Abstr.* 12 (No. 694).]

245. *Tending of Trees, Pruning etc.*

See also Nos. 1800, 2051, 2118, 2153, 2175, 2177.

2137. VENET, J. Élagage artificiel des résineux. [**Artificial pruning of conifers.**] *Rev. for. franç.* 1951 (11), (710–2). [F.]

Describes experimental dry pruning of Spruce, Silver Fir and Scots Pine 15–60 years old, to a height of 6 m. Labour costs averaged Fr.29 per stem. Hand frame-saws of square and triangular form were used, the latter being found more convenient.

2138. ANDERSON, E. A. **Healing time for pruned Douglas Fir.** *Timberman* 52 (12), 1951 (74–80).

Studies were made on 263 knots from 41 bolts of trees pruned 8 to 13 years earlier by saw, Hebo club and axe. The results, given in graphs and tables, showed that trees 30–50 years old can be pruned in the expectation that within 10 years most branch stubs will have healed, and clear wood will be forming over them. The diameter of the pruned branch has less effect upon healing time than the stub length and the rate of diameter growth of the pruned trees.

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

See also No. 2002.

2139. PENISTAN, M. J. **Restocking derelict woodlands: a Scottish example.** *Forestry* 24 (2), 1951 (147–51). 2 refs.

The prescriptions drawn up for the restocking of an area of lowland scrub forest in Ayrshire by saving the useful regrowth and by partial planting are given and the work actually carried out is described. Costs are compared with adjacent clear felling and replanting, and the possibility of the extension of the method to other similar areas is considered. *Author's summary.*

2140. VIGERUST, A. **Bestoknings- og gjenvekstforhold i hogstklasse V*b* belyst ved noen prøveflater.** [**Stocking and natural regeneration in 'felling class' V*b* shown from sample plots.**] *Tidsskr. Skogbr.* 57 (4), 1949 (115–27). [Nor.]

Six sample plots were laid out in Spruce stands in 'felling class' V*b* [cf. *For. Abstr.* 13 (No. 2358)] and for comparison in stands of classes III and IV. Results show that the volume per dekare in V*b* was below that for the other two classes and at an average of 7·4 cu.m. was well below the normal for the site and age class (22·2 cu.m.). When the results were analysed to show the volume in 5 × 5 m. squares, 45% of these squares contained a volume of less than 2 cu.m./ dekare; 46% of this category had no satisfactory trees or plants under 10 cm. d.b.h., 35% had 1–2 plants, 10% had 3–4 plants, and only 9% had 5 or more. These figures indicate that considerable efforts will be needed to bring the forest in class V*b* (estimated as forming 45% of the total area of conifer forest in Norway) into full production.

2141. SILVA, J. A. DE. **Schemes for rehabilitation of Ceylon forests exploited in the war period—1939 to 45.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (479–84).

26. FORESTRY IN AGRICULTURAL AND PASTORAL AREAS (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

See also No. 1829.

2142. WITTICH, W. Landwirtschaftliche Zwischennutzung im Walde als Meliorationsmittel und Hilfe für die Ernährung. **[Temporary agricultural cropping on forest land as a means of soil improvement and as a supplementary source of foodstuffs.]** M. & H. Schaper, Hannover. 1948. pp. 50. 26 refs. [G.] Price *DM*3 [5*s*. 6*d*.]

Reviews German, Austrian and Swiss literature on the subject, considering in turn the relevant characteristics of forest soils, the types of soil suitable for this purpose, the requirements of the agricultural crop plants that could be used, the practical management of such crops, and the prospects for agricultural cropping on individual soil types, with main reference to the diluvial and alluvial soils of N.W. Germany. Concludes that the widespread prejudice against this practice is unjustified, being founded on the results of primitive or faulty operations and experience under extreme conditions. In the author's opinion, there are few soils on which agricultural use need be detrimental, and many in which definite improvements could be achieved under proper treatment, e.g. by the more intensive cultivation and fertilizing made economically possible by agricultural crops. Though practical experience is as yet limited, it covers a sufficient variety of sites to provide a basis for the appraisal of other sites from the physiological point of view. It is largely the technical execution and organization of the work, and the establishment of standard procedures for individual site-types, that need to be worked out in detail.

262. *Fuel and Fodder Forests*

See also Nos. 2001, 2033.

2143. CORBET, H. A. **Fodder trees: suggestions for their wider use.** Imperial Printing Coy. Pty. Ltd., Perth, Western Australia. 1951. pp. 16. 21 refs. Price 1*s*. 9*d*.

Notes on species (mostly native, and including 13 Acacias) suitable for dry areas of Australia.

2144. HOLMES, C. H. ***Casuarina* plantations in Ceylon.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (563–71). 4 refs.

A short review of their history and detailed account of current practice and costs and of the experimental work done to date.

2145. BHARGAVA, O. P. **[Experimental introduction of *Casuarina equisetifolia* in Gwalior State.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951(585–92). With summary of debate.

2146. SHARMA, A. R. ***Casuarina* [fuel] plantations in Puri Division, Orissa.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (554–60).

2147. KESARCODI, S. N. **[*Casuarina* fuel plantations in Bombay.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (560–3).

A short account of their history and a more detailed account of current plantation techniques and costs.

263. *Irrigated Forests*

2148. KADAMBI, K. **The Induval irrigated *Casuarina* plantations [, Mysore].** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (580–5).

A full account of plantations started in 1940.

2149. GARLAND, E. A. **[Irrigated plantations.]** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (518–27).

An account of the practical problems involved, with special reference to experience in Sind and the Punjab, with summary of debate.

264. *Farm Forests*

See also Nos. 1846–7, 2134.

2150. **Special woodlot issue.** *For. Chron.* 27 (3), 1951 (200–57).

Contains articles on farm woodlands in Ontario, Manitoba, Alberta, British Columbia, Saskatchewan, Quebec and New Brunswick, the marketing of products from farm woodlands, and farm woodland in New England and the southern states of the U.S.A.

2151. STEVEN, H. M. **Uses of Cypress trees on the farm.** *N.Z. J. Agric.* 83 (1), 1951 (33–43). A.P.B.

Deals with *Chamaecyparis lawsoniana* and 5 *Cupressus* spp., their silvicultural characters, propagation and uses in shelterbelts and farm plantations.

2152. STEVEN, H. M. **Uses of Pine trees on the farm.** *N.Z. J. Agric.* 81 (6), 1950 (529–37). A.P.B.

Notes on a number of Pines, particularly *Pinus radiata*, their silvicultural characters, suitability for shelterbelts, trimmed hedges and farm plantations, and uses of the timber.

2153. HOLDRIDGE, L. R. **The Alder, *Alnus acuminata*, as a farm timber tree in Costa Rica.** *Carib. For.* 12 (2), 1951 (47–57). 6 refs. [E.Span.]

Discusses the improvement of pasture under Alder and its relationship to N fixation, and presents some data on planting and pruning methods.

production and uses of *A. acuminata* in the important dairy region on the northwestern slopes of Volcán Irazú. Square planting at 14 × 14 varas (1 vara = 33 in.) is recommended. At the end of 10 years one tree may be planted in the centre of each square, to give a distance between trees of ca. 10 varas. The best felling age is about 20 years.

2154. BELTRAM, V. Robinie und Götterbaum in der Bauernaufforstung. [***Robinia pseudoacacia* and *Ailanthus glandulosa* in farm afforestation in Jugoslavia.**] *Schweiz. Z. Forstw.* 102 (10), 1951 (519–23). [G.]

An account (in German) of the work of Miloševič-Brevinac. [Cf. *For. Abstr.* 13 (No. 322).]

265. *Strips or Lines at Road, Rail and Canal Sides etc.; Hedgerow Trees*

See also Nos. 2174–6.

2155. GÖRITZ, H. Die Anlage von Feldhecken. [**The establishment of field hedges.**] *Dtsch. Landwirtsch.* 2 (12), 1951 (631–5). [G.]

Stresses the value of hedges as shelter against wind, and gives advice on: the lay-out and spacing of hedges in relation to the prevailing wind; the use of poor land, road sites and canal banks etc. to avoid encroachment on agricultural land; the form and depth of hedges and the spacing of trees; the choice of species for sandy soils and heathland, richer soils, valleys and wet soils; the age and quality of planting stock; and the maintenance of hedges.

2156. FEDERICO, S. La produzione legnosa delle alberate campestre della pianura padana. [**Wood production of hedgerow trees in the Po valley.**] *Monti e Boschi* 2 (11/12), 1951 (450–5). [It.f.e.]

Discusses the rather scanty data on wood production in the rows of trees (mainly Poplar) commonly planted round fields in the Po valley, and concludes that it averages 2–2·5 cu.m./ha./year, which is about equal to the average yield of Italian forests during 1946–7.

266. *Shelterbelts, Windbreaks*

See also Nos. 2097, 2108–9, 2151–2, 2155.

2157. L'albero e la bonifica. [**Trees and land reclamation.**] *Monti e Boschi* 2 (11/12), 1951 (435–510). [It.]

A special number with articles by several authors, dealing mainly with shelterbelt planting in Italy, and particularly with the use of Poplars and Eucalypts for this purpose.

2158. GIULIANI, R., and SAVI, L. Frangivento e rimboschimento nella bonifica di Arborea. [**Shelterbelt and afforestation in land reclamation schemes at Arborea, Sardinia.**] *Monti e Boschi* 2 (11/12), 1951 (499–510). [It.f.e.]

In the coastal plains of Arborea in Sardinia some 450 ha. of sand dunes have been afforested with *Pinus pinea*, and more than a million Eucalypts (mainly *E. rostrata*) and nearly half a million other trees (Willows, Poplars and Robinia) have been planted in shelterbelts. Planting began in 1934, and the shelterbelts now supply timber, formerly imported, to farms and mines on the island. Data are given on increment and yield of *E. rostrata*, and also on the reduction of wind velocity on protected compared with unprotected land.

2159. SUSMEL, L. I frangiventi nell'Agro Pontino. [**The shelterbelts of the Pontine Marsh.**] *Monti e Boschi* 2 (11/12), 1951 (475–86). [It.f.e.]

[Cf. *For. Abstr.* 8 (No. 2418).] During the period 1937–43 some 600 km. of shelterbelts were planted. The fastest growing species used were Eucalypts (*E. rostrata, E. botryoides*, and *E. globulus*) and *Pinus radiata*. The Eucalypts planted at 1,300/ha. and Pine at 3,000/ha. have given an average production of 20–25 cu.m./ha./year.

2160. BASSI, V. La coltura dell'Eucalipto nel tavoliere di Puglia. [**Eucalypt growing on the 'tavoliere' of Apulia.**] *Monti e Boschi* 2 (11/12), 1951 (487–98). [It.f.e.]

The Società Terra Apuliae is experimenting with *Eucalyptus* (mainly *rostrata*) shelterbelts on the 460,000 ha. reclamation scheme of the 'Tavoliere' (chessboard) near Foggia, which is subject to frequent and violent winds, and has low and badly distributed precipitation (ca. 480 mm./year confined to 80 days), and clayey and often saline soils. Experiments began in 1948 and some 400 ha. have already been planted. Details are given of nursery technique. Seed is collected, as far as possible, from trees already growing in the area; seedlings are transplanted either into transplant beds or into pots, and given plenty of water. They are put out in the field 60–70 days after transplanting, when they should be 60–70 cm. high and ¾ cm. in diameter at the base. Planting is done in late autumn on small mounds spaced 2–2·5 m. apart in ploughed furrows 3 m. apart. Pot plants do best. Plants are then cut back to two buds. Hoeing or mechanical cultivation is carried out in April and May to keep down grass, beeting in the autumn, and hoeing or cultivation again in the second year.

2161. BERNIKOV, V. V. Pervaja Zapadnosibirskaja konferencija po stepnomu lesorazvedeniju. [**First W. Siberian conference on steppe afforestation.**] *Priroda, Moskva* 40 (9), 1951 (79–80). [Russ.] A.P.B.

At this conference, in October 1950, *G. V. Krylov* reviewed forest-plantation and shelterbelt trials in the Altai and Novosibirsk regions, noting that *Larix sibirica* seems to merit special attention as a shelterbelt species; in the Altai region it has shown good growth in youth even on poor chernozems. *Quercus robur* is also known to grow well in many places, and some planted trees of this species in W. Siberia are as much as 50–70 years old. Nest sowings of Oak in 1950 were successful in most cases. *S. I. Kukis* dealt with the history of steppe afforestation in the Altai region. Shelterbelt plantations were started in 1928, chiefly in the dry Kulunum district. The early shelterbelts had many (up to 18) rows of trees and shrubs of 7–8 different species, spaced 1 m. apart. This resulted in high mortality of the tree species and the formation of an over-dense structure by the shrubs. The total area of shelterbelts in the region is now 30,000 ha. Latterly, the type of belt recommended by the Lebyazhinsk Experiment Station has been used. This has 7 rows (main belts) or 5 (subsidiary belts)

the dominant, auxiliary and soil-shading species being mixed in equal numbers. In 1949 a review was made of results to date, and new shelterbelt types proposed: for the northern and submontane districts the recommended type consists only of trees (dominant species + shadebearers), and for the southern districts, of trees (no shadebearers) + shrubs. The recommended dominants are Birch, Larch, Pine, Poplar, and, for the eastern regions, *Quercus robur* and *Tilia* sp.

L. N. Gribanov recommended a shrubless type of belt for the dark-chestnut soils in the Altai region: here the strong winter winds cause excessive snow-drifting in and near belts having a shrub layer, and thus delay agricultural operations in spring. Other speakers dealt with successful 'nest' sowings of Birch; seed supplies of *Tilia* sp.; soil classification; the value of birds in pest control; and the promise shown by Oak as a shelterbelt species in Omsk.

It was resolved, *inter alia*, to request the U.S.S.R. Ministry of Forestry to establish a forest research institute at Novosibirsk, with a series of field stations.

2162. Gnezdovye posevy duba na tretjem godu ih žizni. **[Nest sowings of Oak [in the south of Russia] in their third year of existence.]** *Dokl. vsesojuz. Akad. sel.-hoz. Nauk Lenina* 16 (10), 1951 (6–20). [Russ.] A.P.B.

Brief progress reports from various regions.

2163. JOHNSON, E. W. **Tree and shrub investigations in the Southern Great Plains.** *J. For.* 49 (10), 1951 (716–9). [Southern Great Plains Field Station, Woodward, Oklahoma.]

An account of experimental work (begun in 1914), on the establishment of shelterbelts in the Southern Great Plains. A combination of low, ill distributed rainfall, constant wind, early and late frosts with a mild midwinter, and a considerable range of altitude, make up a climate very adverse to tree growth. The most useful species for average sites in most of the region are Red Cedar, Austrian Pine, Ponderosa Pine, Rocky Mountain and Single-seeded Junipers, Chinese Elm, and Smooth Honey Locust. Ball planting is essential.

2164. CITTADINI, J. C. Especies forestales para cercos en Santa Cruz. **[Tree species for wind-breaks in Santa Cruz.]** *Idia* 3 (35/36), 1950 (23–6). [Span.] C.G.B.

From 1940 onwards the experimental station of Cañadón León in Santa Cruz has been trying out various species, combinations of species, and planting distances, to find which are most suitable for hedges and windbreaks in this region. Some results are presented. *Populus nigra*, *P. angulata*, *P. deltoides*, *Salix viminalis*, *S. alba* var. *caerulea*, *S. caprea*, *Elaeagnus angustifolia*, *Tamarix* sp. and *Thuja* sp. are all recommended. The most suitable initial planting distance is 40–80 cm., with thinnings as called for. For a single-row windbreak *P. nigra* is recommended. For a double-row windbreak, one row of *S. viminalis* and one of *P. nigra*, the distance between trees being 40–80 cm., and the distance between rows 50 cm. to 1 m. For a 3-row windbreak the first row should be *S. viminalis* (spacing 50 cm.), the second row *P. nigra* (1 m.) and the third row *P. angulata* (1 m.), the distance between rows being 1 m. Cuttings, if used, should be 40–50 cm. long, planted in spring to a depth of $\frac{2}{3}$ of their length. If nursery plants are used they should be 1–3 years old.

2165. SUAREZ DE CASTRO, F. Las barreras vivas en la conservación de los suelos. **[Live hedges in soil conservation.]** *Agric. trop., Bogotá* 7 (8), 1951 (45–8). [Span.] A.P.B.

Presents a table giving the spacings necessary for shelterbelts (1) for field crops and (2) for coffee plantations, on slopes of various gradients, and suggests some suitable species.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

See also Nos. 1845, 2153, 2238–9.

2166. VADEHRA, S. L. **Forest grazing in Kashmir State, its management and improvement.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (403–6).

2167. WILSON, J. A. **Grazing management and improvement in [forests of] Madras Province.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (367–79).

Reviews progress made in Madras under the heads of regulation of grazing, determination of essential cattle, improvement of fodder supplies (e.g. by taungya, silage etc.), artificial introduction of grasses, improvement of water supplies in grazing grounds. The writer concludes that the greatest single obstacle to further improvement is the nominal valuation set on forest grazing instead of a fair charge. A resolution in accordance with this opinion was passed by the conference.

2168. GRIFFITH, A. L. **Grazing as a national problem.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (380–7). 6 refs.

A short review of the existing position, with a commentary on J. A. Wilson's paper. [Cf. preceding abstract.]

2169. WATTS, L. F. **A program for range lands.** *Unasylva* 5 (2), 1951 (49–54).

Discusses the importance of proper management of 'range lands' or 'wild lands', and the advisability of their control being largely in the hands of Forestry Departments. The work of the U.S. Forest Service in range management is described.

2170. GARRISON, G. A., and RUMMELL, R. S. **First-year effects of logging on Ponderosa Pine forest range lands of Oregon and Washington.** *J. For.* 49 (10), 1951 (708–13). 10 refs.

In a study of the effects of logging on Pacific Northwest Ponderosa Pine ranges it was found that tractor logging denuded 21% of the ground of herbaceous and shrubby vegetation and covered another 5% with slash. Comparable figures for cable logging were 15% and 15%, and for horse logging 12% and 5%. Deep disturbance of the soil occurred on 15% of the tractor-logged area but on only 1·9% and 2·3% of the area logged by cable and horse respectively. It is estimated that the damage done by tractor logging involves a 32·2% reduction in density of herbaceous and shrubby vegetation on the logged area.

2171. RUMMELL, R. S. **Some effects of livestock grazing on Ponderosa Pine forest and range in central Washington.** *Ecology* 32 (4), 1951 (594–607). 9 refs.

A comparison was made of natural regeneration on two virgin Ponderosa Pine stands, both protected from fire. One stand is situated on a hill-top inaccessible to livestock; the other, only 4 miles away and on a similar geological and topographical site, is heavily grazed. It was found that the ungrazed stand had dense ground cover of *Calamagrostis rubescens* and *Carex geyeri*, and very sparse tree reproduction, while the grazed area had sparse herbaceous ground cover and dense Pine reproduction. It is concluded that heavy grazing of the competing grasses, rather than fire exclusion, is the prime factor explaining the dense advance tree growth on the latter site.

2172. **Grazing reduces Pine stands.** *Research and Farming, Raleigh* 8 (4), 1950 (49). (*Rep. N.C. agric. Exp. Sta.* No. 72, 1949.)

An investigation is being made in North Carolina on the effects of grazing on mixed hardwood and Pine stands. Preliminary results show that grazing greatly reduces height growth and crown spread of hardwoods, but, in one year, the number of hardwoods was not materially decreased, whereas over half the young Pine seedlings had disappeared.

2173. BLAIR, B. O. **Mesquite seed and seedling response to 2,4-D and 2,4,5-T.** *Bot. Gaz.* 112 (4), 1951 (518–21). 2 refs. O.B.D.

Seeds and seedlings of *Prosopis juliflora* var. *velutina* were cultured for 72 hours in aqueous solutions of 2,4-D and 2,4,5-T respectively at concentrations of 1,2,5,10 and 50 p.p.m. Suppression was measured and expressed in root and hypocotyl growth, and total fresh weight, in comparison with controls. The Mesquite seeds and seedlings were responsive to both preparations, but at concentrations above 1 p.p.m. 2,4,5-T was the more toxic. The young plants are more sensitive than mature plants to these herbicides. [Cf. *For. Abstr. 13* (*No. 336*).] *From author's summary.*

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also Nos. 1880, 1893, 1940, 2097, 2151–2, 2155, 2164–5.

2174. RAM, B. S. **Roadside avenues in the Punjab.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (139–44).

Choice of species, planting methods, tending, protection etc.

2175. ACOSTA SOLIS, M. Plantación y conservación de los árboles ornamentales. [**Planting and upkeep of ornamental trees.**] *Publ. Dep. for. Ecuador* No. 13, 1951. pp. 13. [Span.]

Instructions on choice of species, planting times and methods, watering and pruning.

2176. LEONTJEV, V. L. Ob ozelenenii poselenii v pustyne, udalënnyh ot rek, ozër i oazisov. [**Raising amenity plantations in desert settlements remote from rivers, lakes and oases.**] *Priroda, Moskva* 40 (7), 1951 (38–9). 3 refs. [Russ.] A.P.B.

Species for desert areas in the U.S.S.R. where a limited amount of brackish water can be got from wells or artificial rainwater reservoirs, must bear summer heat raising soil temperatures to 85° C. and winter cold with strong winds, to – 30° C., withstand some sulphate salinity, and give the best possible shade over the longest possible period. Suitable species are: *Morus alba, M. nigra*, an *Ulmus* sp. of the group *Densa, Elaeagnus angustifolia*, and *Tamarix* spp., e.g. *T. gracilis, T. ramosissima* [cf. *For. Abstr.* 13 (No. 1940).] These should be protected from wind and sand by belts of desert plants such as *Haloxylon aphyllum, Salsola* spp. and *Calligonum* spp.

Where repeated watering is impracticable or where the groundwater is very saline, setts of a local *Salix* species ('*Ak-tal*') may be planted in holes made down to groundwater level, which are then filled with sand and, if possible, given 2 buckets of water. The setts are cut back to leave only 3–4 cm. above ground level, and after the first season's growth all but 3–4 of the strongest shoots are removed. Protection from rodents and domestic animals is essential. This method has given good results in S. Kazakhstan and is worth trying with other species, e.g. *Tamarix ramosissima, Populus diversifolia* and *Elaeagnus angustifolia*.

Where no watering can be done and the above method is impossible, the most drought-resistant of the local desert shrubs should be planted, the following (in order of increasing drought resistance) having been used in the S. W. Kara-Kum: *Tamarix ramosissima, T. gracilis, Haloxylon aphyllum, Salsola* spp., *Calligonum* spp., and *Haloxylon persicum*. *Tamarix, Salsola*, and *Calligonum* spp. can be propagated in early spring by cuttings, preferably of 2-year-old shoots 0·2–2·0 cm. in diameter and 35–50 cm. long, well firmed in and with 1–3 cm. projecting above ground level. For *Haloxylon*, seedlings or wildings should be used, with roots not less than 0·35 m. long, planted in holes filled with moist sand. The stem should be cut back to 3–5 cm. above ground. It is advantageous, where possible, to give even a single watering.

2177. **Mechanical hedgecutters.** *J. Land Agents' Soc.* 50 (12), 1951 (501).

Attention is drawn to certain disadvantages entailed by the use of mechanical hedgecutters. When they are used to trim the tops of hedges, subsequent growth springs from the top of the hedge and not from the lower portions, resulting in hedges that are thin at the bottom. Where hedgerow growth is too thick for the machine, and is hacked instead of clean cut, the result is deterioration and eventual death. When hedges were cut and laid by hand, sapling trees were always left, to grow into useful and valuable hedgerow timber, whereas saplings are destroyed by mechanical hedgecutters.

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also No. 2354.

2178. BEHRNDT, G. Mitanbau von Arzneipflanzen auf Forstkulturen. [**Cultivation of medicinal**

plants in forest plantations.] *Forst u. Holz* 6 (18), 1951 (265–7). 7 refs. [G.]

Discusses the possibilities of growing camomile, marigold [*Calendula* sp.], great mullein [*Verbascum thapsus*], *Digitalis* sp., valerian, and peppermint, along with forest crops, and presents an estimate of costs and returns.

282. *Bark Crops*

2179. CHATURVEDI, M. D. **A study of the South Indian tan Wattles.** *Indian For.* 77 (10), 1951 (606–11).

The methods hitherto used for establishing Wattle plantations in S. India are: (1) in the Nilgiris, pit planting at the break of rains at 11 ft. spacing, the whole plantation being surrounded by a Eucalypt windbreak of 5 rows 6 ft. apart, with internal windbreaks (5 rows 11 ft. apart) alternating with 50 rows of Wattle; (2) in Kodaikanal direct sowing on 4-ft. scalped contour strips spaced 5 ft. apart, followed by 2 weedings and strip cleanings, with bracken screens to protect seedlings from frost in the first two winters. Formation costs are Rs.40/acre for (1) and Rs.60/acre for (2). As these elaborate and costly methods have met with only partial success, natural regeneration of Wattle in the neighbourhood of plantations was investigated with a view to discovering a more efficient technique. Frost is the principal cause of failure, and it was observed that abundant Wattle regeneration had invaded neighbouring Eucalypt plantations and was making vigorous growth, presumably because of the shelter to be found there. It was also observed that Wattle growing on old potato or pyrethrum fields made vigorous growth and was practically immune to frost damage. It is suggested that a possible method of forming Wattle plantations would be to plant Eucalypts 40 ft. apart 3 years in advance, and then introduce the Wattle under the protection so provided. In the Nilgiris, where land is in great demand, the best and most economical method would be to raise a crop of potatoes in order to ensure sufficient soil working and eliminate grasses, and plant Wattle in the following year.

2180. QURESHI, I. M. **Note on Wattle plantations in Bombay State.** *Indian For.* 75 (11), 1949 (1951), (440–4 + 4 photos). 4 refs.

Methods of establishment, initial growth, and costs of experimental plantations of *Acacia decurrens* var. *mollissima*.

2181. DUGELAY, A. **La remise en valeur des forêts de chênes-lièges incendiées.** [**The restoration of burnt Cork Oak forests.**] *Rev. for. franç.* 1951 (11), (687–94 + 4 photos). [F.]

Sufficient regeneration can usually be obtained from coppice regrowth from burnt stumps and natural seedlings, provided that they are released from competing vegetation, thinned and pruned. Artificial regeneration is difficult, though direct sowing gives fair results if protection against rabbits is provided.

283. *Fruit and Seed Crops*

See also No. 1902.

2182. PINTO, R. W. **Babassú—Brazil's wonder nut.** *For. Comm. Wkly.* 45 (2), 1951 (3–4). A.P.B.

A short account of the distribution of *Orbignya barbosiana*, the character and uses of the nuts and the problem of finding and designing a machine to crack them without injuring the kernel. Statistics are given for potential and actual production and exports from Brazil. [Cf. *For. Abstr.* 8 (p. 186).]

285. *Leaf Crops*

See also No. 2001.

2183. RAMASWAMY, M. N., GOWDA, D. R., and KRISHNAMOORTHI, R. ***Ocimum kilimanjaricum* in Mysore.** *Indian For.* 77 (1), 1951 (612–9 + 1 plate). 4 refs.

Summarizes the results of a 2-year experiment in growing this crop, and concludes that it is practicable to grow it in this region.

3. HARVESTING OF WOOD, LOGGING AND TRANSPORT. RATIONALIZATION OF WORK; WORK STUDIES. FOREST ENGINEERING

31. LOGGING AND TRANSPORT: GENERAL

See also No. 1986.

2184. HUTSON, H. P. W. **Extraction plans: their preparation and assessment on an economic basis.** *Emp. For. Rev.* 77 (4), 1951 (359–72).

Methods of preparing plans and assessing costs are illustrated by examples.

32. FELLING AND RELATED OPERATIONS

322. *Preparatory Measures*

See also No. 2212.

2185. **[Girdling experiments.]** *Rapp. Inst. nat. Étude agron. Congo belge 1950*, 1951 (35–6).

Experiments have been made in the girdling of *Terminalia superba* for starch depletion. Samples of the wood of girdled trees and controls are now being tested for resistance to *Lyctus* attack. Girdling is done most easily in the rainy season, but has most effect (weak callus-formation and less suckering) in the dry season. It therefore seems best to do it at the end of the rainy season.

Experiments were also made in girdling the non-commercial species in forest stands. The following species can be killed by girdling, provided that the cut penetrates 5–10 cm. into the wood: *Pachylobus pubescens*, *Pentaclethra eetveldeana*, *Hymenocardia ulmoides*, *Pseudospondias microcarpa*, *Ricinodendron africanum*, *Canthium oddoni*, and *Grumilea* sp. Rapid callus-formation enables *Antrocaryon micraster* and *Sterculia tragacantha* to survive girdling.

2186. **[Borer attack induced by girdling of *Eucalyptus*.]** *Rep. For. Dep. Mauritius 1948*, 1949 (4).

Experimental girdling of *E. tereticornis* in several parts of Mauritius in order to obtain partial seasoning, resulted in attack by large numbers of the cerambycid beetle, *Phoracantha semipunctata*, which had previously been supposed to be rare in this island.

2187. **[Girdling of *Eucalyptus robusta*.]** *Rep. For. Dep. Mauritius 1950*, 1951 (10).

No attack by *Phoracantha semipunctata* occurred after girdling of *E. robusta* trees growing at an elevation of 1,500–1,600 ft. in Mauritius. Timber from trees felled a year after girdling had a better appearance and split less than timber from ungirdled trees.

2188. **Chemical girdling. Supplementary report** Armstrong Forest Co. Northeast Pulpwood Research Center, Gorham, New Hampshire. 1951. pp. 2 + [3].

Describes a field demonstration by the Armstrong Forest Company to illustrate progress in chemical girdling. A small quantity of chemically girdled Spruce showed bark separation as successful as that already obtained with other species; as Spruce is not native to the region, the lack of insect infestation in this instance may not always be found. Experiments in Canada indicate that softwoods should be harvested 6–8 months after treatment to prevent insect attack. Green streaks and other indications of incomplete poisoning are attributed to tool cuts in the wood, an axe incision at the top of the girdle appears to dam the flow of solution. A girdling technique involving breaking the bark and knocking off sections with the heel of the axe is therefore recommended. Each crew includes 5 men girdling and 2 poisoning, and working strips have been widened from 1 to 1½ chains. Success has been found to be directly related to ease of peeling at time of treatment. It is therefore desirable to organize crews so that work need not start too early or continue too late in the season, and it is best to begin work late in the morning and to continue until late in the afternoon, thus using the part of the day when transpiration current is greatest. Experiments with concentrations of Na_2HAsO_3 indicate that there is no advantage in varying from the standard Atlas 'A' commercial preparation. Details are given of the organization of work within a crew.

2189. MCINTOSH, D. C. **Effects of chemical treatment of pulpwood trees.** *Bull. For. Br. Can.* No. 100, 1951. pp. 30. 10 refs.

Large-scale experiments were carried out in 1947 and 1948 to test the effectiveness of various chemicals, and the relative importance of the season of felling and treating, on bark removal and reduction of weight of wood. Some 3,800 trees of Jack Pine, Black Spruce, Balsam Fir, Aspen, Balsam Poplar and White Birch were treated. Soluble As compounds applied in June and July proved to be the most effective for facilitating removal of bark in all species tested. Coniferous species generally showed a significant decrease in weight of wood after treatment, but the Poplars showed none, while the wood of treated Birch tended to be heavier. The report describes the application of the chemicals and the illustrations include photographs of several girdling tools (both hand and power) in action. Traces of barkbeetles and wood borers were found in trees that had been reduced in weight; these were less in As- than in ammate-treated trees.

2190. BALDWIN, H. I. **Chemical peeling of hardwoods.** *Fox For. Notes N.H. For. Dep.* No. 47, 1951. pp. 1.

Experimental poison-girdling of Oak, Aspen and Gray Birch, using 10% 2,4,5-T and 2,4,5-T + 2,4,3-T was unsuccessful. Neither treatment killed trees rapidly enough to fix the cambium in the stage that results in bark loosening.

323. *Felling and Subsequent Primary Conversion*

See also Nos. 2195–9, 2213.

2191. HYLER, J. E. **Chain saws grow in popularity.** *Sth. Lumberm.* 183 (2291), 1951 (70–80).

Describes types of chain saws used in felling and conversion, and discusses their use and maintenance.

2192. **New earth auger attachment for power chain saws.** *Trees, Cleveland, Ohio* 11 (5), 1951 (13).

A newly designed earth auger attachment for petrol-engine chain saws is now being produced by the Mall Tool Co. of Chicago, for use on their Mall Model 11 saw. The chain-saw assembly is detached and replaced by the auger for drilling holes for fence posts, power or telegraph poles etc., or planting holes. It is equipped with 30-in. augers in 6-, 9-, or 12-in. diameters. [Cf. *For. Abstr.* 12 (Nos. 2376–7).]

2193. POND, T. M. **Report on power saw tests [with discussion].** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1139 (*B*–7–*c*), 1951. pp. 2 + 3.

Reports on a series of controlled tests covering operations on 21,220 cords and using 81 one-man chain saws of 8 different makes, between 8 August 1950 and 19 February 1951. Gives preliminary figures for average production of pulpwood per man-day of 10 working hours for felling, skidding, and cross-cutting and piling, and for costs and earnings. The figures indicate increased production of 20–30% per day over the hand saw.

2194. HALLSTRÖM, G. Kalkyl över enmansmotorsågens lönsamhet. **[Calculations on the profits from a one-man motor saw.]** *Svenska SkogsvFören. Tidskr.* 48 (4), 1950 (391–405). [Sw.]

A study of felling and crosscutting with one-man motor saws shows an estimated cost per cutting minute of 10 öre, covering amortization, maintenance, running costs and interest. Tables are given showing the comparative times for felling and crosscutting by hand and motor saws, at different snow depths and stand densities for stump diameters ranging from 5 to 50 cm. A formula is given to show for what conditions one-man motor saws will be remunerative, from which the minimum profitable stump diameter is shown to range, varying with snow depth and stand density, from 15 to 25 cm. This includes most classes of timber in normal conditions, but not pulpwood. Further formulae and tables are given for the rate of profit over hand-sawing to be expected by the feller with his own motor saw, and by the forest owner hiring out motor saws to his workers.

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE

See also No. 1800.

2195. DEMOISY, R. G. **Relogging to portable utilization plant.** *Circ. Inst. For. Prod., Wash.* No. 13, 1951. pp. 4.

A plant consisting of an electric generator, a drag saw, a splitter, and conveyors, and employing 10 men, is being used to process logs so defective that they are not tallied in the Institute's Unused Wood Inventory in 1949. Clear bolts of wood are split out from diseased, rotting and otherwise defective Hemlock and Douglas Fir logs, and loaded in bundles on a truck with dual rear-axle drive and dual-axle wagon-type trailer. Records for a week showed 11–12½ cords per unit load.

2196. AHRENS, L., and VANDENPUT, R. Contribution à l'étude des travaux d'ouverture d'une plantation en région forestière. **[Opening up plantation sites in a forest region.]** *Bull. agric. Congo belge* 42 (3), 1951 (617–54). [F.flem.]

It is calculated that clearing one ha. of forest of medium density for the establishment of Oil-Palm plantations in the Belgian Congo requires 244 man-days of work, of which 159 or 65·5% are needed for felling the forest and clearing the planting lines. Mechanization is not practicable in the existing conditions. Rationalization of the felling and clearing operations reduced the latter figure to an average of 132·7 man-days per ha. The essence of this method, which is explained in detail and illustrated by more than 30 photographs, consists in control of the direction in which trees are felled, so that as much as possible of the tree, and all the crown, shall fall into the space between the demarcated planting lines. The second important principle is that felling shall be done in two stages, first the undergrowth, climbers and understorey trees, second the overstorey, each stage being followed immediately by clearing away of the felled material.

34. STORAGE IN THE FOREST AND AT LOG DUMPS

See Nos. 2563–7.

35. RATIONALIZATION OF WORK. WORK STUDIES

See also Nos. 2084–5, 2088, 2193–4, 2196.

2197. FRYJORDET, T. Et eksempel på tidsstudier ved tømmerhogst. **[An example of time studies in felling and primary conversion.]** *Tidsskr. Skogbr.* 57 (5/6), 1949 (157–66). [Nor.]

Time studies were carried out for 3 days each year between 1946 and 1949 at the State School for practical forestry at Osen. Some of the results are given in graphs and tables, for diameter classes between 11 and 25 cm. The felling time for 11 cm. diam. was about 1 min., increasing to about 3 min. for 19, and to 5 min. for 25 cm. The figure for felling time in minutes and that for the calculated cross-cut area at breast height in sq. dm. were roughly the same. The time for trimming averaged 20% higher than that for felling, increasing from 1·2 min. for 11 cm. diam. to 3·6 min. for 19 cm. The average for barking at 0° C. increased from 3–4 min. for 11 cm. diam. to 7–8 min. for 19 cm. At –10° the figures were 60–70% higher. The total for all the operations covered by felling and primary conversion at 0° was 8 min. for 11 cm. diam., increasing to 18–19 min. for 19 cm.; the figures for –10° were 9 and 24 min. respectively. The graphs giving the relationship between diameter class and the time taken, per cu.m. of timber, for felling, trimming and barking, show a regular decrease in time with increasing diameter. Figures showing the approximate cost per tree felled, at 1949 wage rates, are tabulated.

2198. FRÖHLICH. Faustregel zur Beurteilung der Leistung Waldsägen. **[Rule of thumb for assessing the performance of forest saws.]** *Forst u. Holz* 6 (19), 1951 (281–3). [G.]

From his own observations [not given in detail] the author has deduced a rough and ready measure of the efficiency of crosscut saws, suitable for use on the logging site and requiring no watch, tables, or laborious calculations. Taking as the basic factor the area cut per double (back-and-forth) stroke of the saw, he finds that 10 sq. cm. represents a satisfactory performance for a triangular-toothed saw cutting hard wood, noting also that: (1) a performance 50% above this would rate as very good; (2) any saw should show a 10% better performance on soft wood; (3) much sap or severe frost may reduce performance by as much as 20%; (4) a reduction by the same figure is necessary if the log diameter differs greatly from the optimum for the saw concerned; and (5) saws with raker teeth should have a performance 30% higher. In practice, the number of double strokes needed to cut through a log of measured diameter (to the nearest cm.) would be counted, the rough sectional area calculated mentally, taking π as 3·1, and this area divided by the number of double strokes, after which any necessary allowances are made as detailed in (1)–(5). Two examples are given.

2199. KOOLS, J. F. Ongevallen in de bosbouw. [Accidents in forestry.] *Ned. Boschb.-Tijdschr.* 23 (11), 1951 (274–81). 11 refs. [Du.e.]

Figures for accidents in the Netherlands are compared with those for Germany, Switzerland, U.S.A. and Canada. In all countries the number of accidents is high compared with other industries, being particularly high for felling.

2200. MERCIER, R. **Truck and tractor accidents in forest operations.** *Pulp Paper Mag. Can.* 52 (12), 1951 (180–187).

Discusses some examples.

37. TRANSPORT

See also No. 2200.

372/377. *Land Transport*

See also No. 1800.

2201. COLLIER, R. D. **Progress in skidding by wire.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1144 (*B*–8–*g*), 1951. pp. 3 + 3.

Experiments on a cheap load-attachment to be used for one trip only, showed good results from a small open twisted steel link. The use of this would cost about 10 cents per cord of wood skidded.

For longer distances, 2-in. hardwood blocks, e.g. of Birch or Maple, slid smoothly and wore well even on spans of ¼ mile. Preliminary tests on models of an intermediate support for multiple-span wire skidding indicated that loads under 2½ cu. ft. (115 lb.) can be passed safely at speeds of up to 35 m.p.h. and loads up to 4·0 cu. ft. (180 lb.) at not more than 30 m.p.h. It appears that if the gradient above the support is between 20 and 35% with spans under 500 ft., the present equipment will work well with loads up to 180 lb. An appendix lists equipment used, its cost, and suppliers.

2202. STEINLIN, H. Der Rückrolli Rohr. [The Rohr skidding wheels.] *Schweiz. Z. Forstw.* 102 (11), 1951 (555–71). 7 refs. [G.g.f.]

Describes (with illustrations) the construction, operation, and costs of logging wheels manufactured by Ernest Rohr, Staufen bei Lenzburg.

2203. KANTZER, C. J. **Forest thinning by small tractors in Mason County, Washington.** *Circ. For. Prod. Inst., Wash.* No. 17, 1951. pp. 4.

Describes two small tractors used with rubber-tyred sulkies, for hauling thinnings in second-growth Douglas Fir stands averaging 60 years old, and analyses hauling costs.

2204. MÉGILLE, X. DE. Le tracteur forestier. [The forest tractor.] *Rev. Bois Appl.* 6 (12), 1951 (23–7). [F.]

Analyses the requirements which a forest tractor should fulfil in connexion with forest work in general, soil conditions, safe and easy driving, and economic maintenance.

2205. ALLOUARD, P., and CONRARD, J. L'actualité en matière de tracteurs au début de 1951, en France. [Tractors on show in France at the beginning of 1951.] *Bois For. Trop.* No. 18/19, 1951 (157–67). [F.e.span.]

Describes (with photographs) tractors exhibited at the Lyons and Paris fairs. Tractors likely to be of particular interest to tropical operators are the 60- and 130-h.p. caterpillars built by the Aciéries du Nord, and the wheel tractor with 1-cylinder engine brought out by the Société française de Vierzon.

2206. LEIJONHUFVUD, A. C. Erfarenheter från traktordrift vid ett norrländskt skogsföretag. [The use of tractors in a Norrland forest concern.] *Svenska SkogsvFören. Tidskr.* 48 (1), 1950 (86–97). [Sw.]

Discusses the types of tractor used (a 5- to 7-ton crawler model is considered most suitable for Norrland conditions), tractor roads, transport organization, loading and unloading.

2207. LAAGE-HELLMAN, B. Synpunkter på norrlandsskogsbrukets biltransporter. [Aspects of lorry transport in Norrland's forestry.] *Svenska SkogsvFören. Tidskr.* 48 (2), 1950 (167–87). [Sw.]

Discusses the types of road, the organization of the different operations, the advantages of owning and of hiring lorries, wages, and the relative costs of transport by horse, lorry, tractor, railway train and floating.

2208. WITHENSHAW, G. **Drott loading and truck hauling of 16-foot wood on the operation of Abitibi Power and Paper Co. Ltd., Port Arthur Woods Division.** *Pulp Paper Mag. Can.* 52 (12), 1951 (144, 146). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 214 (*B*–1) Appendix A1).

Discusses briefly the organization of an operation using lorries for hauling and Drott loaders.

2209. HOOKER, L. W. **Test of American Chain Company Grip-Trip bundling chain in pulpwood logging.** *Pulp Paper Mag. Can.* 52 (10), 1951 (146–52).

Describes with illustrations the Grip-Trip assembly, developed for handling bundles of sugar cane. It consists of a length of ⅝-in. chain of a special alloy, threaded through a modified choker slide combined with a quick-release hook. A spring-loaded pawl allows the chain to slide through the

device in one direction but prevents it from slipping back in the other. An excentrically pivoted hook is locked firmly in place by a spring-locked trigger until the bundle is to be released, when the trigger is displaced by a sharp blow, and the hook pivots to release the chain from the bundle. Tests carried out in Michigan using the assembly to load pulpwood from drag-sleds to lorries to railway wagons, and to skid bundled pulpwood, were very successful.

378. *Water Transport*

See also Nos. 2587–8.

2210. TUOVINEN, A. **Jään vahvistaminen vesitämällä varmistaa talviniputuksen onnistumisen. [Reinforcement of ice by watering ensures successful bundling in winter.]** *Metsät. Aikak.* 1951 (5), (135–7). [Fi.e.] (*Metsäteho Report* No. 58.)

One of the disadvantages of winter bundling is the danger of weak ice. During last winter, a screw pump with a capacity of over 3,000 litres/min. driven by power from a lorry, motor-cycle or motor-saw, gave good results. When the pump was lorry-driven with one man operating, it watered ca. 0·5 ha./6 hr. With recent improvements, its performance may be bettered, and as one lorry can drive two pumps, work done can be doubled. The new method permits winter bundling whatever the conditions; haulage periods are extended, and accidents reduced. *From author's summary.*

2211. HALE, J. D. **Factors that affect the buoyancy of pulpwood logs. I. Sapwood.** *Mimeo. For. Prod. Lab., Can.* No. *O*-157, 1950. pp. 9. P.R.

Sapwood of logs of floatable species generally absorbs water much faster than the heartwood. The necessity for distinguishing sapwood in floatable species becomes important. Methods for doing so in light-coloured woods are suggested. Although the use of chemical indicators is cited, the desirability of distinguishing sapwood by visual inspection in the field is emphasized. It is suggested that with further knowledge a criterion might be established by which sinkers could be recognized and separated. The poor floaters might either be given some seasoning to improve their buoyancy or be otherwise utilized.

2212. MCINTOSH, D. C. **Studies of the floating properties of pulpwood logs.** *Mimeo. For. Prod. Lab., Can.* No. *O*–158, 1951. pp. 9. P.R.

Presents results of buoyancy tests conducted in 1947–8 on trees seasoned by chemical treatment. Logs from chemically treated Jack Pine and Balsam Fir floated better because of an appreciable decrease in moisture content. With both green and seasoned logs, it was found that the greatest loss in buoyancy occurred during the first few days after launching. Many logs from untreated hardwood trees sunk during tests: Logs from trees in which the moisture was reduced by felling and allowing the foliage to remain intact for some time, floated better than logs from untreated trees. Logs of Aspen stripped and piled for 1 month before launching, showed improved buoyancy. *From author's summary.*

2213. KLEM, G. G. **Fløtnings- og skurforsøk med barket og ubarket skurtømmer. [Research on floating and sawing barked and unbarked sawtimber.]** *Norsk Skogind.* 5 (11), 1951 (356–9). [Nor.e.] P.R.

In 1949, data were obtained from 2,713, and in 1950 from 2,551 saw-logs, fully barked, barked in patches and unbarked. Results are shown in graphs. The % loss during floating for unbarked Spruce appeared to be lower than for barked or partly barked logs; for Pine there was no significant difference between the categories. For both species the proportion of better-grade sawn goods appeared to be highest for logs that had been floated with their bark on. Only damage caused by drying out in the spring and by floating, e.g. checking and blue-stain, was taken into account in the grading. In a small-scale test during winter, 1951, Spruce and Pine logs were floated in a log pond, and taken out and weighed at intervals; the barked logs were found to take up considerably more water during the first months of floating than the unbarked ones. This may explain the unexpectedly low loss of unbarked logs.

2214. EKLUND, R. **Puominosturin käyttö kouralla varustettuna pinotavaran siirton. [The use of a boom crane fitted with a grapple for moving stacked wood.]** *Metsät. Aikak.* 1951 (5), (131–2). [Fi.e.] (*Metsäteho Report* No. 61.)

The use of a boom crane fitted with a grapple, for unloading lighters, is described and illustrated. Where 1-m. firewood was transferred by the crane from the lighter to a conveyor belt, 600–800 cu.m. stacked measure was moved in 20 hr. The grapple, which takes about 1 cu.m. stacked measure at a time, is manufactured by the Owen Bucket Co., Cleveland, Ohio, U.S.A.; it can also be used for loading floating timber on to the bank and for moving stones and scrap. *From author's summary.*

38. FOREST ENGINEERING

382. *Buildings*

2215. BÉRARD, A. **Construction d'un chalet pour les bûcherons. [Construction of a wooden house for woodcutters.]** *Rev. for. franç.* 1951 (11), (713–6). [F.]

Analyses costs and gives plan and elevations of a 4-roomed chalet suitable for woodcutters in mountainous forest regions.

383. *Roads and Bridges*

See also Nos. 2206–7.

2216. HARRISON, J. L. **Forest engineering: roads and bridges.** Oliver & Boyd, Edinburgh. 1951. pp. xvi + 366 + 19 photos. Price £1. 10*s*.

A manual for the use of forest officers. Part I, Forest Roads, contains chapters on the following: Location and reconnaissance; laying out alignment on ground and forming preliminary estimate of cost; selection of type of road, drainage, and culverts; retaining walls; road design and various road constructions, soil stabilization; quarrying and the collection of stone and road metal; estimates for road construction and repairs. Part II, Bridges, contains the following chapters: Timber testing; timber mechanics, timber columns, graphic statics; types of

road bridges; loading on forest bridges, general construction details of simple timber road bridges; calculation of simple beam bridges; strutted and trussed bridges; suspension and cantilever bridges; river training works; timber joints.

2217. ELMLUND, A. Från vägverksamheten vid Jämtlands läns skogsvårdsstyrelse. [**The road-building activity of the Jämtland County Forestry Board.**] *Från skogsvårdsstyrelsernas arbetsfält* pp. 5–15. [Sw.] *Suppl.* to *Svenska SkogsvFören. Tidskr.* 49 (2), 1951.

Discusses types of road and bridge suited to different conditions, the machinery used, and distribution of costs among land owners.

2218. ZAKARIÁS, A. Új munkaeszközök, uj munkamódszerek. [**New working instruments, new work methods.**] *Erdész. Lap.* 86 (7), 1950 (203–11). [Hung.russ.f.g.]

An illustrated account of bulldozer-working in Hungary, with special reference to forest-road construction and the performance of a 1948 model C-80 Stalinetz 180-h.p., 4-cylinder machine. Specifications and performance are given in detail. On compacted clay soil with an average slope of 8–10% it could move 2–2·5 cu.m. of soil at a time to distances of 10–70 m. and level 100–130 m./8-hr. shift, of 4-m. road; 15–20 skilled men are needed for dressing etc.

385. *Drainage, Irrigation, Sedimentation. Water Supply*

See also No. 1829.

2219. MAARTMANN, K. Sprengning av skogsgrøfter med grøftedynamitt. [**Blasting forest drains with dynamite.**] *Tidsskr. Skogbr.* 57 (12), 1949 (344–8). [Nor.]

Results of some blasting experiments in 1947 and 1948 are discussed briefly. The drains must be cleaned out as soon as possible after blasting. Results are best where there is a firm bottom (mineral earth or rock) at the required depth of the drain; the amount of material thrown out by the explosion will decrease with increasing depth to firm ground. Results are best when the soil is wet, generally in spring or autumn. The rate of work varies with soil conditions; firing and cleaning a drain 60 cm. deep took 2 men 2 min. per linear m. in peat, and 3–3·5 min. in stony mineral soil. Wage rates in Norway are based on 7 classes of site difficulty. Costs for blasting and for hand-digging are roughly the same in the easiest classes, but blasting is cheaper for the most difficult sites. Draining by blasting is 5–6 times as quick as hand digging; a 2-man crew can blast, clean and finish 100–200 m. per day. Conditions for the purchase of dynamite in Norway are discussed. [Cf. *For. Abstr.* 13 (No. 1279).]

4. FOREST INJURIES AND PROTECTION

See also Nos. 2021–2, 2708.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

See No. 2352.

411. *Natural and Biological Control*

See Nos. 2246–7, 2289, 2294–6, 2298.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

See also No. 2260.

2220. RAUSCH, A. Fragen um das Buchensterben. [**Dying-off of Beech.**] *Forst u. Holz* 6 (22), 1951 (323–4). [G.]

A comparison of Beech stands on loess soils and on siliceous limestone confirms the supposition that long-term weather influences coupled with site factors are responsible for red heart and dying-off of Beech. These factors act through their influence on water availability and, on nutrient uptake and translocation, which on limestone soils are more easily disturbed by comparatively slight changes of temperature than on loess soils. The author maintains that the best prophylactic measure, particularly for Beech on limestone soils is proper thinning in the upper storey, to ensure good crown and root development.

421. *Air Currents*

See Nos. 1997–8, 2020.

422. *Temperature Influences. Frost. Heat. Drought*

See Nos. 1851, 1873, 1958, 2031–2, 2038, 2067, 2070, 2264.

424. *Soil Conditions. Erosion Effects*

See also Nos. 2071, 2254, 2315.

2221. WALLACE, T. **The diagnosis of mineral deficiencies in plants by visual symptoms: a colour atlas and guide.** H.M. Stationery Office, London. 2nd ed. (rev.) 1951. pp. vii + 107 + 312 coloured photos + [iv]. [University of Bristol Agricultural and Horticultural Research Station, Long Ashton, Bristol.] Price £1. 15*s*.

2222. GILBERT, F. A. **The place of sulfur in plant nutrition.** *Bot. Rev.* 17 (9), 1951 (671–91). 109 refs.

Discusses the amount of S needed by plants, losses and gains of S in the soil, areas of S deficiency in North America, symptoms of S deficiency and the use of S as a soil corrective. To cure lime-induced chlorosis of plants and trees on alkaline soils, applications of S, alone and with manure, have been used with success where there is free circulation of air and moisture. The S oxidizes to sulphuric acid, which reacts with $CaCO_3$ to release soluble Ca, which in turn is carried off by drainage water.

2223. ILJIN, W. S. **Metabolism of plants affected with lime-induced chlorosis (calciose). II. Organic acids and carbohydrates.** *Plant & Soil* 3 (4), 1951 (339–51). 8 refs.

This study of the changes in organic acids and carbohydrates in the leaf-sap of 17 plants (including several woody species) affected with lime-induced chlorosis showed that, on the whole, the metabolic processes involving these substances had become unbalanced.

2224. OLSON, R. V., and CARLSON, C. W. **Iron chlorosis of sorghums and trees as related to extractable soil iron and manganese.** *Proc. Soil Sci. Soc. Amer. 1949*, 14, 1950 (109–12). 13 refs. (*Contribution, Department of Agronomy, Kansas Agricultural Experiment Station* No. 415.) L.S.

A study was made of 3 groups of soils in Kansas: (1) samples from beneath chlorotic sorghum plants, (2) samples from round chlorotic *Quercus palustris*, Spiraea and Pine, and (3) samples from areas where no chlorosis was found. Analyses show that, while low extractable Fe contents, high Mn/Fe ratios, high pH values and the presence of free lime, appear to aggravate Fe chlorosis in plants, it seems that other, unknown, factors determine whether or not chlorosis actually develops.

425. *Chemical Influences (Atmospheric)*

See also No. 1851.

2225. SHAW, C. G., FISCHER, G. W., ADAMS, D. F., and ADAMS, M. F. **Fluorine injury to Ponderosa Pine.** *Abstr.* in *Phytopathology* 41 (10), 1951 (943).

Foliage damage and growth inhibition in *Pinus ponderosa* have been observed in an industrial zone north of Spokane, Wash. Chemical analyses of needles have revealed a fluoride content varying from 4 to 600 p.p.m. of dry needle weight. The fluoride concentrations decrease with increased distance from the centre of damage. Air analyses revealed significant concentrations of fluoride in the atmosphere in the area of Pine damage. Typical injury has been produced in Ponderosa Pine and Gladiolus by fumigation for 24 hr. in an atmosphere containing 0·012 p.p.m. of HF. Injury to the same species has been prevented by spraying with calcium oxide.

43. FOREST FIRES

2226. WINKLER, O. Waldbrandstatistik der Schweiz. [**Forest fire statistics for Switzerland.**] *Schweiz. Z. Forstw.* 102 (11), 1951 (579–86). [G.g.]

Data are given by cantons for the decennia 1930–39 and 1940–49, and more detailed statistics for the cantons of Aargau and Ticino.

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

2227. RENON. Météorologie et incendies de forêts dans le Var. [**Meteorology and forest fires in the department of Var.**] *Rev. for. franç.* 1951 (11), (695–703). [F.]

Analysis of conditions during the 1950 fire season showed that a state of extreme fire danger was reached when the following conditions occurred together—temperature above 27° C., relative humidity below 40, and a west wind with velocity above 15 metres/sec.

2228. GODDEN, F. W. **Forest protection and fire weather forecasting in the National Forests.** *Proc. West. For. Conserv. Ass.* 41, 1950 (35–6).

2229. LINDENMUTH, A. W., and NELSON, R. M. **Forest fire danger measurement in the United States.** *Unasylva* 5 (2), 1951 (67–70).

2230. BARROWS, J. S. **Fire behavior in Northern Rocky Mountain forests.** *Sta. Pap. Nth. Rocky Mt. For. Range Exp. Sta.* No. 29, 1951. pp. viii + 103 + 16 tbls.

A training manual which summarizes information based on research at the Experiment Station on the principles of combustion, the weather, topography of the region, fuels and fire-behaviour rating.

432. *Prevention and Control*

See also No. 1829.

2231. KLING, J. B. **Co-operative forest fire control: Policy determination and administration in the Clarke-McNary grant-in-aid program.** *Bull. N.Y. St. Coll. For.* No. 25, 1951. pp. 106. 54 refs.

Discusses methods evolved by the U.S. federal government for grants in aid of forest fire protection made to state governments.

2232. SURDAM, E. **Radio in protection communications.** *Proc. West. For. Conserv. Ass.* 41, 1950 (41–2).

2233. **Telecommunications.** *Rep. For. Comm. Vict. 1949/50,* 1951 (20–1).

A new type of portable 'transceiver', the TRP1, has been developed and 50 sets are in use and giving satisfactory service. This small, light-weight unit can be used as a personal pack set or as a semi-fixed installation with a range of ca. 100 miles.

Work continued on experimental mobile equipment and distances of up to 40 miles were achieved with low transmitter power and an aerial of practical dimensions. Work is now being concentrated on a unit small enough to be mounted under the instrument panel of the vehicle, where it can be directly controlled. [Cf. *For. Abstr.* 9 (No. 1363).]

2234. **Report of the fire protection field meeting of the woodlands section, Canadian Pulp and Paper Association.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1196 (*F*–3), 1951. pp. 30 + 10 photos.

Includes papers on power failure in a helicopter; contemplated uses for helicopters by the U.S. Forest Service; helicopters for detection and suppression; the use of helicopters to combat forest fires; and forestry communication systems by very high frequency radio. [Cf. *For. Abstr.* 13 (No. 1800).]

2235. FERRIS, C. **Planning heliport sites.** *Fire Control Notes* 12 (4), 1951 (1–8).

Discusses the designs of helicopters in use, the siting of landing grounds within a fire-fighting area, and minimum requirements of surface and surroundings for safe landing and take-off.

2236. HANCHET, W. H. D., and DRUMMOND, J. W. R. **The use of helicopters to combat forest fires.** *Pulp Paper Mag. Can.* 52 (10), 1951 (134–6). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1194 (*F*–3), 1951).

A discussion of possible uses of the Sikorsky S-55 in carrying equipment from headquarters to an advanced base, in carrying crews and equipment from the advanced base to the fire and bringing in reserves, and in removing crews and equipment in an emergency or when the fire is out.

2237 HALL, R. L. **The helicopter as a fire-fighting unit.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1200 (*F*–3), [1951]. pp. 4.

Describes the use of a Bell 47D-1 helicopter in two fires in Ottawa.

2238. **Pasture strips serve as forest firebreaks.** *Research and Farming, Raleigh* 8 (4), 1950 (4). (*Rep. N.C. agric. Exp. Sta.* No. 72, 1949).

The possibility of using strips of improved pasture as forest firebreaks is being explored at Tidewater Experiment Station and the Frying Pan Experimental Range. Lanes 18 to 36 ft. wide were prepared and, in flat and poorly drained sites, were ditched and slightly cambered. Four grasses and 4 legumes were tested. The lanes were not inflammable in the first year, and will apparently continue to be effective firebreaks where the sod prevents weedy growth and is green and closely grazed in winter and spring. Red top [*Agrostis vulgaris*] has proved very successful, but it also suppresses associated legumes. Clover [*Trifolium repens*] of the Ladino or White Dutch varieties, and big trefoil [*Lotus uliginosus*] are the most promising of the legumes tested. [Cf. *For. Abstr.* 13 (No. 1845).]

2239. **Pasture firelanes.** *Res. News Stheast. For. Exp. Sta.* No. 13, 1951 (2–3).

The inflammability of pasture fire-lanes established in the coastal plain of N. Carolina in 1948 was tested during a period of high fire hazard in April, 1950. A hot flame from a kerosene flame-thrower was applied along the windward edge or down the centre of each plot and the rate of spread and behaviour of the fire were noted. Legumes gave better fire protection than grass, and a mixture of the two gave better results than either alone. Ladino clover gave best fire protection because it encouraged close grazing of grasses associated with it and remained green during the fire season. Lespedeza and big trefoil ranked next among the legumes, while of the grasses, tall fescue and ryegrass gave best fire protection, followed by Dallis grass.

2240. TAUXE, G. J., and STOKER, R. L. **Analytical studies in the suppression of wood fires.** *Trans. Amer. Soc. mech. Engrs.* 73 (7), 1951 (1005–20). 9 refs. P.R.

Presents the results of two analytical studies associated with fire suppression of an idealized forest-type fuel; certain aspects of the studies, however, are applicable to wood fires in general. A qualitative discussion of the burning and the

suppression of wood fires is presented in the introduction. The first study concerns the instantaneous interfacial temperatures that occur when a drop of water impinges upon the hot surface of a burning piece of wood and shows for typical cases that the drop will not vaporize instantaneously or bounce off, and that initially the relative wetting abilities of the suppressing agents may be of importance. The second study utilized an electrical analog computer to investigate the simulated thermal behaviour of wood as it burns and is extinguished by surface cooling, by penetration cooling, and by oxygen dilution. One important result indicates that the minimum theoretical ratio of the quantity of water for suppressing a typical fire to the volume of the burning wood is in the order of 1/150. Laboratory and field-test fires have given ratios in the order of 1/7, showing the large room for improvement in suppression techniques. *Authors' summary.*

2241. AAMODT, E. E. **A slip-on attack unit.** *Fire Control Notes* 12 (4), 1951 (34–8).

A 1-ton lorry with 4-wheel drive has been equipped for fire fighting with a removable tank, pump and plough. The 245-gallon tank is equipped with 6-in. rollers and can easily be rolled on to a platform when full of water. The plough, which will make a fire-break about 60 in. wide, and the pump, which will deliver 50 gal./min. free flow and 23·7 gal./min. at a pressure of 150 lb./sq. in., can be controlled from the driving seat. Tests indicate that safe driving speeds, fully loaded, are 50 m.p.h. on highways, 40 on gravel roads, 25 on side roads and 6–15 m.p.h. on open field. The lorry will climb a 50% slope on grass and brush, and a 32% slope when ploughing. The net weight of all equipment plus full water load is 3,005 lb. and of the lorry is 3,235 lb.

2242. **Butane-Diesel flame thrower.** *Fire Control Notes* 12 (4), 1951 (30–3).

The flame-throwing trailer unit [see *For. Abstr.* 8 (No. 2706)] has been enlarged (fuel capacity from 70 to 120 gal.) and safety features added. Cost of the unit complete with trailer in March 1951 was $1,400. Further details and specifications are available in drawings F-26-01 to 04 at the Arcadia Equipment Development Centre, U.S. Forest Service, 701 N. Santa Anita Ave., Arcadia, Calif.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See also Nos. 1832, 2181.

2243. **Forest fire losses in Canada 1950.** Forestry Branch, Department of Resources and Development, Ottawa, 1951. pp. 7 + 5 dgms. + 5 tbls.

2244. LINDENMUTH, A. W. JR., KEETCH, J. J., and NELSON, R. M. **Forest fire damage appraisal procedures and tables for the Northeast.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 11, 1951. pp. 28.

Discusses methods and gives tables for assessing fire damage in dollars per acre for hardwood, Pine, and Pine/hardwood stands, planted and natural, of different diameter classes and different crop densities.

2245. RICHARDSON, S. D. **Forest fire insurance. Part 1. Forest fire insurance abroad.** *Quart. J. For.* 45 (4), 1951 (222–6). 12 refs.

Reviews the position in Canada, the U.S.A. and some European countries. A later article will deal with Great Britain.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See Nos. 1955, 2015.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 1851, 2063–6, 2121, 2135–6, 2173, 2188–90.

2246. WILLIAMS, J. R. **The control of the Black Sage in Mauritius by *Schematiza cordiae* Barb. (Col., Galerucid.).** *Bull. ent. Res.* 42 (2), 1951 (455–64 + 2 plates). 13 refs.

Describes the introduction of *Schematiza cordiae* into Mauritius in 1947, the bionomics of the insect and its controlling effect upon *Cordia macrostachya* between 1947 and 1950. The release of laboratory-reared adults was begun in March 1948. By February 1949 large populations had developed and were inflicting severe injury on *C. macrostachya*. By the middle of 1950 most expanses of Black Sage scrub in the island had either been stripped of leaves and inflorescences or severely defoliated. As a result much scrub is now dead or is being suppressed by other vegetation, while partial defoliation and direct inflorescence attack have reduced the reproduction of other bushes. [Cf. *For. Abstr.* 12 (No. 702); 13 (No. 410).] *From author's summary.*

2247. **[Weed control in Mauritius.]** *Rep. For. Dep. Mauritius 1950*, 1951 (10–1).

The beetle *Schematiza cordiae* introduced for the control of *Cordia macrostachya*, has reduced the latter to an insignificant species. Experiments have shown that *Rubus roridus* can be successfully controlled by cutting.

2248. WARD, R. K. **Control of Willows with chemicals.** *N.Z. J. Agric.* 83 (2), 1951 (123–5). A.P.B.

Briefly describes chemicals suitable for poisoning both large and small Willows, and methods of application.

2249. LARSON, W. H. **Forest roadside control of Alder and Willow.** *J. For.* 49 (10), 1951 (705–7).

A standard tank truck with Griswold 1-in. fog nozzle and 6-ft. applicator was used for spraying roadside brush in Douglas Fir forest, consisting mainly of Willow and Red Alder. Of the various concentrations of Na salt of 2,4-D tried, it was found that the 500 p.p.m. solution was satisfactory. For a 500-gal. charge of this solution, 2½ lb. of 'Special Mix' and 1½ lb. of 82% 2,4-D (costing $4·00 together) were used. Best results were obtained between mid-May and June. Total costs vary with local conditions, accessibility and water etc., but it is estimated that in the experiment the cost was $11·90 per mile sprayed, exclusive of travel to and from the job, broken hose etc. Observations of

treated strips 2 years after treatment showed that they were still substantially free from regrowth.

2250. Produits phytocides. [Weedkillers.] *Rapp. Fonds for. nat. Jan./Dec. 1950*, 1951 (59). [F.]

Tests of herbicides with a 2,4-D base confirmed their efficacy in destroying regrowth of Robinia, Birch and Broom. Experiments are being made on Hornbeam.

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

2251. **[Dodder laurel and mistletoe in forests of Victoria.]** *Rep. For. Comm. Vict. 1949/50*, 1951 (9).

In some parts of the northern Box and Ironbark forests, the spread of dodder laurel (*Cassytha melantha*) and mistletoe is causing serious concern. The development of these parasites is largely due to the intermission of control measures during and since the war because of labour shortage. In some places dodder is so prevalent that the establishment of regeneration even by coppice shoots is impracticable. Saplings up to 30 ft. high have been smothered. The possibility of control by spraying with growth-regulating substances is being investigated.

2252. MATHUR, A. K. **Angiospermic parasites of our forests.** *Indian For.* 75 (11), 1949 (1951), (449–56). 25 refs.

Chiefly notes on the Indian species of *Loranthus* with their distribution and principal hosts.

443. *Fungi and Bacteria*

See also Nos. 2022, 2708.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See Nos. 2058, 2068–71, 2254.

443.3. Diseases of Older Stages

2253. KLJUŠNIK, P. I. Gribnye bolezni èkzotov. **[Fungus diseases of exotics.]** *Lesn. Hoz.* 3 (7), 1950 (71–2). [Russ.]

Very brief notes [no control measures indicated] on the more important diseases of *Sophora* [*japonica*?], *Juglans regia*, *Celtis* [*australis*?], and *Phellodendron amurense*, in the U.S.S.R.

Stem, Butt and Root Rots; Root Diseases

See also No. 2557.

2254. RILEY, C. G. **Research projects, Saskatoon Laboratory.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (2–3).

A study of heart rots of *Picea glauca* was continued in the neighbourhood of Athabaska-Slave Lake, Alberta. The principal rot is the brown stringy type caused by *Flammula connissans*. Encouraging results followed preliminary experiments with fertilizers to correct a chlorotic condition of White Spruce seedlings in the nursery, and efforts are being continued to discover the cause of 'red patch' in Spruce seedbeds.

2255. DAVIDSON, A. G. **Decay of Balsam Fir in New Brunswick.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (1).

Analysis of 933 Balsam Firs in New Brunswick showed that white-rot fungi caused most of the cull loss. *Stereum sanguinolentum* was the most important cause of trunk rot and *Corticium galactinum* of butt rot. Trunk rots were responsible for the culling of 24·2% of the total gross merchantable volume, and butt rots for 12%. Incidence and amount of decay increased with age. None of the trees examined under 40 years of age had decay, but half the trees at 90 years and all over 160 years were decayed. Cull volume at 80 years was ¼ of gross merchantable volume, at 140 it was ½, and at 170 ¾. Decay was also found to be correlated with diameter.

2256. RISHBETH, J. **Butt rot by *Fomes annosus* Fr. in East Anglian conifer plantations and its relation to tree killing.** *Forestry* 24 (2), 1951 (114–20). 10 refs.

A short account is given of the incidence in East Anglia of butt rot of Douglas Fir, Larch, and Spruce caused by *F. annosus*. The earliest stages do not differ from those found in the killing of Pines; small living roots are infected by contact with stump roots containing the parasite. In young conifers killing is associated with a low resistance to invasion of all tissues. By the time conifers are about 25 years old, however, resistance has increased markedly. In Pines all tissues tend to become resistant, checking growth of the parasite, whereas in the other species only the outer tissues become resistant. Thus in large roots of Douglas Fir, Larch, and Spruce, *F. annosus* grows far more rapidly in the inner wood than in the outer wood and bark, from unaffected regions of which small branch roots may be formed. The parasite enters the butt from one or more rotted roots and may then ascend several metres in the heartwood. Secondary fungi are often present in such advanced stages of rot and interesting successions can be traced. The relation of butt rot to thinning is discussed and ways in which various factors may influence the disease are suggested. [Cf. *For. Abstr.* 13 (Nos. 1329–30).] *Author's summary.*

2257. TORGESON, D. C. **The *Phytophthora* root rots of *Chamaecyparis lawsoniana* Parl.** *Abstr.* in *Phytopathology* 41 (10), 1951 (944).

Phytophthora cinnamomi has caused root rot in several plantations of *Chamaecyparis lawsoniana* in Oregon. *P. lateralis* has already been reported from Oregon as a pathogen of *C. lawsoniana*. Symptoms caused by the two fungi are identical, but the species are readily distinguished by differences in their morphological characteristics, temperature requirements, and rate of growth. *P. lateralis* is more widely distributed in Oregon than *P. cinnamomi*, but the latter has a larger host range. It has attacked plantations of *Taxus baccata* var. *fastigiata*, and in experimental inoculations has caused root rot of *Rhododendron ponticum*, *Castanea dentata* and *Taxus cuspidata*.

2258. FERNANDES, C. TAVEIRA. A 'doença da tinta' do castanheiro em Espanha. **[Ink disease of Chestnut in Spain.]** *Publ. Serv. flor. aqüic. Portugal* 14 (1/2), 1947 (87–104). 4 refs. [Port.e.]

Reviews work in the control of Chestnut ink

disease carried out at the Agricultural Plant Pathology Station at Corunna and discusses Urquijo's control method by which trees are treated with solutions of Cu salts. Some examples of successful treatment are cited. The work of the Agricultural Plant Pathology Station and the Forest Institute at Madrid in ink disease control is also briefly surveyed. [Cf. *For. Abstr.* 4 (191).]

2259. GUERREIRO, M. GOMES. Melhoramento do castanheiro—directrizes e finalidades. **[Improvement of Chestnut—aims and objects.]** *Publ. Serv. flor. aqüic. Portugal* 13 (1/2), 1946 (19–43 + 1 plate). 37 refs. [Port.e.]

Discusses attempts made in Portugal to combat *Phytophthora cambivora*, (1) by introducing exotic species of Chestnut for fruit production, (2) by using the stock of exotic species for grafting, and (3) by chemical treatment. No very promising results were obtained, and the author concludes that selective breeding is the only answer to the problem. He describes work done in Portugal on the systematic hybridization of *C. sativa* and *C. crenata*. [Cf. *For. Abstr.* 13 (Nos. 182, 428, 1874, 2708).]

2260. MARCELIN, P. Essai sur le dépérissement de la châtaigneraie. **[The die-back of Chestnut.]** *Bull. Soc. languedoc. Géogr.* (*Ser. 2*) 22 (1), 1951 (125–56). [F.e.] O.G.

The author reports an investigation of the die-back of Chestnut groves in the Cevennes and other districts of France. Although the immediate cause of death is the Chestnut ink disease, the ultimate causes are edaphic and climatic. The Chestnut stands in the affected regions occur on soils originally poor, which have been further degraded by erosion and leaching to the point of podzolization. A series of droughts has further diminished the vigour of the trees, and the depopulation of the countryside has led to the decay of anti-erosion works (terracing, walls etc.). The stands have been yet further injured by heavy exploitation for tanstuffs. The author urges the necessity of repairing terraces, of determining to what elevation and what distance from villages they are an economic proposition, and discovering the most favourable mesoclimate.

2261. PIMENTEL, A. A. LOPES. O sobreiro também e parasitado pela *Phytophthora cambivora* (Petri) Buis., agente da 'doença da tinta' do castanheiro. **[Cork Oak is also parasitized by *P. cambivora*, the pathogen causing ink disease of Chestnut.]** *Publ. Serv. flor. aqüic. Portugal* 13 (1/2), 1946 (45–9). 5 refs. [Port.port.e.]

A parasitic fungus collected from *Quercus suber* in the region of Alpiarça (Tagus Valley) proved to be a very virulent strain of *Phytophthora cambivora*, which has already been isolated from *Castanea sativa*, *Juglans regia*, *Pseudotsuga taxifolia* and *Quercus robur*. The symptoms of attack on Cork Oak, and the results of experimental inoculations are briefly described. [Cf. *For. Abstr.* 11 (No. 1466).]

Wilts, Diebacks etc.

2262. POMERLEAU, R. Le développement de la maladie hollandaise de l'orme suivant l'époque de l'inoculation. **[The development of Dutch Elm disease according to the time of inoculation.]** *Annales de l'ACFAS, Montréal* 15, 1949 (109–11). [F.] L.S.

Since the discovery of *Ceratostomella ulmi* in Canada, investigations have been made into the development of the disease under the conditions found in Quebec. Results are presented of a study to find at what time of year Elm is susceptible to infection. Inoculations made from 1946 onwards showed that the trees are susceptible from the middle of May until the end of July, and that inoculations made in the second half of June are the most likely to succeed. [Cf. *For. Abstr.* 7 (Nos. 2040–2).]

2263. ROTH, E. R. **The viability of spores and mycelium of *Endoconidiophora virescens* on Sugar Maple lumber.** *Plant Dis. Reptr.* 35 (8), 1951 (379–81). A.P.B.

Cf. *For. Abstr.* 13 (No. 1337).

Cankers, Stem Rusts etc

2264. LATOUR, J.-M. Intervention de la gelée dans la formation du chancre du mélèze d'Europe. **[The action of frost in the formation of canker of European Larch.]** *Trav. Sta. Rech. Groenendaal* (*Sér. C*) No. 15, 1951. pp. 14 + 5 photos, 5 dgms. 33 refs. [F.f.flem.]

(1) Comparison of the saprophytic and parasitic forms of *Dasyscypha willkommii* on Larch showed that the only morphological difference was in the size of the reproductive organs, those of the parasitic form being the larger. (2) A histological study of some typical cankers confirms the belief that frost is at least an active agent in their formation. (3) Agar cultivation of pieces of bark taken from (*a*) healthy bark close to a canker, (*b*) necrotic bark from the edge of a canker (recently dead) and (*c*) necrotic bark from the centre of a canker (dead for a year or more), gave the following results: no mycelium developed on (*a*), mycelium developed in 20% of samples of (*b*), and on all samples of (*c*). It is concluded that *D. willkommii* can only colonize dead tissues.

2265. BUSNEL, R.-G., DARPOUX, H., and RIDÉ, M. Utilisation de la chaleur transmise par la rayonnement infrarouge comme méthode de désinfection de châtaignes contre les spores d'*Endothia parasitica* (Murril) Anderson. **[Disinfecting Chestnuts from spores of *Endothia parasitica* by means of infra-red radiation.]** *C.R. Acad. Agric. France* 37 (13), 1951 (513–5). 3 refs. [F.] A.P.B.

Describes an apparatus devised in the laboratory for sterilizing chestnuts infected with *Endothia parasitica*. The nuts are passed on a conveyor, first through an oven where they are subjected to radiation from two banks of 12–13 250-watt infra-red lamps, and then through a hot-air chamber maintained constantly at 60° C. Tests with deliberately infected material showed that infra-red treatment exceeding 70 sec. gives complete sterilization. [Cf. *For. Abstr.* 13 (No. 2708).]

2266. MALENÇON, G., and MARION, J. Un parasite des subéraies nord-africaines: l'*Hypoxylon mediterraneum* (D. Ntrs.) Ces. et D. Ntres. **[A parasite of North-African Cork plantations: *H. mediterraneum*.]** *Rev. for. franç.* 1951 (11), (681–6 + 3 photos). [F.]

Summarizes the results of research since 1936 on this disease of *Quercus suber* in N. Africa. *H. mediterraneum* (*H. sertatum*), which has now attained epidemic proportions in Morocco, is normally a saprophyte and has been found on a number of species (*Q. ilex*, *Q. faginea*, *Castanea sativa* and several *Eucalyptus* spp.). It is suggested that its preference for and pathogenicity to *Q. suber* may be connected with the peculiar development of the bark of this species, which permits a remarkable spread of the fructifications of the fungus. Infection appears to be through wounds and is evidently encouraged by lack of vigour in the host. The conidial stage of the fungus has been identified and named *Botrytis sylvatica* Malençon.

2267. Rol, R. Le chancre du chêne rouge d'Amérique. [Canker of *Quercus borealis*.] *Rev. for. franç.* 1951 (11), (704–7 + 2 photos). [F.]

Q. borealis, which has been much used to replace *Q. robur* and *Q. toza* in forests of the Pays Basque attacked by Oak wilt, has been found to be suffering from a stem canker, the causative agent of which has been identified as *Phytophthora cinnamomi*. The physiological consequences of the disease appear, at present, to be comparatively unimportant, but its economic results are more serious, since the affected part, usually the butt log, is useless for anything but firewood. [Cf. *For. Abstr.* 12 (No. 2345); 13 (No. 1333).]

2268. Bakarcic, M. La cancrosis del plátano. [Canker of *Platanus orientalis*.] *Idia* 4 (42/43), 1951 (3–4). [Span.] C.G.B.

Isolations and inoculations of a fungus causing bark canker in *P. orientalis* in the Paraná Delta proved the pathogen to be *Phytophthora cinnamomi*. Infected trees show vertical fissures in the bark due to a blocking of the sap flow through the sieve tubes of the phloem. Infection usually begins at the base of the stem, but eventually the tree may be killed by extensive bark necrosis. Laboratory experiments showed that *P. cinnamomi* can only form zoosporangia in an aqueous medium, and it is thought that the wet soil of the Delta may be responsible for the spread of the fungus in this region. Ample opportunity for infection is afforded by the practice of growing *P. orientalis* from cuttings.

2269. Bagchee, K. D. Contributions to our knowledge of the morphology, cytology and biology of Indian coniferous rusts. Part II. Observations on the occurrence of *Cronartium ribicola* Fischer and *Peridermium indicum* Colley and Taylor on *Pinus excelsa* Wall. in India with reference to their distribution, pathology, inoculation experiments and comparative morphology. *Indian For. Rec.* (*n.s.*) *Botany* 4 (1), 1950 (1–41 + 6 photos + 5 dgms. + 1 map). 38 refs.

The author attempts to show that the Indian Blue Pine rust, *Peridermium indicum* is morphologically, physiologically, and biologically the same as European and American *Cronartium ribicola*, any differences between the two being due to climatic factors. It is proposed that the name of this rust should be *Cronartium ribicola* Fischer forma *indica*. It was proved by inoculation experiments that, contrary to the views of American workers, the Indian Blue Pine [*Pinus wallichiana*] is not immune to White Pine blister rust [*C. ribicola*], but is moderately susceptible. [Cf. *For. Abstr.* 4 (56).] *From author's summary.*

Foliage Diseases

2270. Bagchee, K. D. Contributions to our knowledge of the morphology, cytology and biology of Indian coniferous rusts. Part III. The biology of *Peridermium brevius* (Barc.) Sacc. (*Coleosporium barclayense* sp. nov. on *Senecio rufinervis* DC.), and *Melampsora oblonga* sp. nov. on the needles of *Pinus excelsa* Wall. *Indian For. Rec.* (*n.s.*) *Botany* 4 (2), 1950 (42–64 + 5 photos + 2 dgms.). 15 refs.

2271. Wolf, F. A. A new needle-cast fungus on Chihuahua Pine. *Lloydia* 14 (2), 1951 (111–4). 3 refs. P.R.

An account dealing with the structure and identity of a fungus collected near Mexico City and regarded as a pathogen of Chihuahua Pine, *Pinus leiophylla*. Its structural features closely resemble those of *Hypoderma saccatum*, but it is regarded as distinct and designated *Hypoderma mexicanum* sp. nov.

2272. Leaf cast of Larch, *Meria laricis*. *Leafl. For. Comm., Lond.* No. 21 (rev.) 1951. pp. 4. Price 3*d*.

2273. Fernández Valiela, M. V. Resumen de un estudio sobre el estado sanitario de los álamos del Delta. [The state of health of Poplars [and Willows] in the [Paraná] Delta.] *Idia* 4 (42/43), 1951 (1–3). [Span.] C.G.B.

Reviews fungus diseases of Poplar and Willow in the Paraná Delta during the last 4 years. *Salix alba* var. *caerulea* in this area suffers considerable set-backs in growth from the anthracnose caused by *Marssonina nigricans*. Hybrid Willows, however, are more resistant. *Populus* 'A.M.' seems to have developed greater resistance to *Septoria musiva* and growth rates are now promising. *P. nigra* does not thrive in this area, but *P. deltoides* s.l. [?] does.

2274. Grosjean, J. Onderzoekingen over de mogelijkheid van een bestrijding van de loodglansziekte volgens de boorgat-methode. [Research on controlling silver-leaf disease [of plums] by injection.] *Tijdschr. PlZiekt.* 57 (4), 1951 (103–8). 6 refs. [Du.du.e.] E.M.B.

Tabulates the results of experiments on controlling silver-leaf by injecting various chemicals including leaf and bark extracts of *Populus candicans* [cf. *For. Abstr.* 13 (No. 60)] and bark extracts of *P. trichocarpa*. Neither gave particularly good results.

2275. Hutchinson, P. B. A bacterial disease of *Dysoxylum spectabile* caused by the pathogen *Pseudomonas dysoxyli* n. sp. *Repr.* from *N.Z. J. Sci. Technol.* 30*B* (5), 1949 (274–86). 8 refs.

A disease affecting ca. 99% of mature *Dysoxylum spectabile* is described. The host plant occurs in coastal areas of the North Island and the extreme N.E. portion of the South Island, the disease being present throughout. Although the proportion of young trees infected is less than that of mature trees, they are shown to be equally susceptible. The

symptoms are greasy, translucent leaf lesions; 'shot-holes' in the leaf tissue; greasy lesions in the leaf axils. Symptoms are present throughout the year but there is less infection during winter. Transmission of the disease is effected by contact with diseased tissue and by rain splash. The causal agent is shown to be a new, probably endemic, bacterial pathogen for which the name *Pseudomonas dysoxyli* is proposed. Its morphological, physiological and cultural characteristics are described. *From author's summary.*

444. VIRUS DISEASES

See also No. 1840.

2276. MILLER, P. R., and O'BRIEN, J. **An apparently new Sweet Gum disease in Maryland.** *Plant Dis. Reptr.* 35 (7), 1951 (295–7). A.P.B.

Symptoms are dieback, beginning at the periphery of the small branch tips and proceeding towards the main trunk, and streaks ranging from amber colour to deep brown in the sapwood of the lateral branches. The leaves on diseased branches are usually much smaller than normal, and by mid-summer become pigmented with anthocyanin and are shed. Next year the foliage tends to appear in bunches near the trunk, and by midsummer the affected trees are dead. The disease is thought to be caused by a virus.

45. DAMAGE BY ANIMALS

451. *Mammals*

See also Nos. 1977, 2172, 2192, 2305.

2277. **Damage by rodents.** *Rep. For. Dep. Uganda 1950*, 1951 (16).

Rats [species not named] continued to be a menace to Cypress [*Cupressus lusitanica*] at Mafuga [cf. *For. Abstr.* 10 (No. 2258)]. Control measures cost £262 or, reckoning by the known numbers killed, 56 cents a rat. Breeding takes place in May–June and October–November and this knowledge should be used in timing control measures. Of poisons used, $BaCO_3$ and red squill were both effective.

2278. **Rodent damage.** *Rep. Intermt. For. Range Exp. Sta. 1950*, 1951 (43–4).

Examination of feeding by porcupines on saplings and poles (3·6–10·9 in. d.b.h.) showed that: (1) The denser the stand, the greater the % of trees damaged. (2) Feeding increased on trees from 3·0 in. d.b.h. to 9 in. and then dropped sharply. (3) The dominants were commonly attacked. (4) None of the trees examined was actually killed. Two Ponderosa Pine plantations 13 and 10 years old were examined for damage by rabbits and porcupines. In the former 21% of trees were damaged, none killed; in the latter, the figures were 23% and 1·41% respectively. The distribution of numbers of trees undamaged, damaged and girdled was independent of locality.

2279. FRITZ, E. **Bear and squirrel damage to young Redwood.** *J. For.* 49 (9), 1951 (651–2).

In the Redwood region of California damage to young *Sequoias* up to about 30 in. d.b.h. and 25 years old is extensive. Bears apparently strip the bark off in the spring (mainly in May) in order to lick the sweet sap from the new springwood cells. Bark is stripped from a few inches above ground level to a part where the diameter is ca. 4 in. and the trunk is not strong enough to support the weight of a bear. This upper limit of stripping may be more than 50 ft. from the ground. Several 24-in. trees were found to have broken tops, possibly broken by a heavy animal. Branches are not attacked. The centre of infestation seems to be the cut-over Little River basin. Attacks were first noticed in 1946 and since then more than 10,000 trees, scattered over the area, have been killed. [Cf. *For. Abstr.* 13 (Nos. 452, 1353).]

Squirrels do considerable damage, but their work is usually confined to large saplings or the thin-barked areas in the upper crowns of the larger young trees.

2280. HAHR, G. **Älgskadegörelse på tallungskog. [Elk damage to young Pine forest.]** *Svenska Skogsv-Fören. Tidskr.* 48 (1), 1950 (24–44). [Sw.]

Figures showing the variations in weight from month to month of a young elk kept in a ¼-ha. enclosure, and its average daily consumption of Pine, Juniper and Birch shoots, are tabulated. It is estimated from these figures and from the difference between the known fodder requirements of stall-fed cattle and those grazing freely, that the average daily consumption for elk would be Pine 8·01, Juniper 0·48 and Birch 7·30 kg.; it is possible, however, that these figures are rather too low for elk in the wild state. Figures showing the composition by age, sex and weight of a herd of elk are tabulated. The weight of the 'normal' elk is estimated to be 282 kg., roughly that of the elk used in the previous experiment. The daily consumption of the 'normal' elk, plus a supplement to compensate for the growth of young animals and for calves born into the herd and surviving 1 year (estimated at 0·38 per adult animal) is calculated at 9·45 kg. Pine, 0·56 kg. Juniper and 8·61 kg. Birch. The period of Pine browsing runs from mid-December to mid-March, covering at least 90 days. The annual consumption of Pine may therefore amount to as much as 900 kg. per elk. Two plots were examined in the spring of 1949 for elk damage; on both about 60% of the young trees were unlikely to survive. Only 2,100 and 1,342 plants per ha. respectively remained. Browsing by elks is generally on trees from 6 or 7 to 14 or 15 years and is confined to shoots of the last 2 years, up to 4–5 mm. in diameter. Figures showing the weight of branches within these limits per ha., the damage (expressed as a % of the original number of plants) for different degrees of browsing (expressed in kg./year), and the damage for different densities of elk population are shown in graphs. A density of not more than 3 elks per 1,000 ha., giving 12% damage, is recommended as a suitable compromise between the differing interests of forestry, hunting and wildlife conservation. [Cf. *For. Abstr.* 8 (No. 695).]

2281. KREFTING, L. W. **What is the future of the Isle Royale moose herd?** *Trans. N. Amer. Wildlife Conf.* No. 16, 1951 (461–72). 7 refs. B.A.P.

This study of moose populations on Isle Royale includes a survey of browse in the south-western

part of the island in 1945, 1948 and 1950. Considerable damage has been sustained by *Populus tremuloides* during that period, and much of the regeneration has been killed. *Betula papyrifera*, which ranked second in winter diet in 1945, held first place in 1950. Unlike Aspen it has good regenerative powers and can withstand much heavy use, though such intensive browsing (34% of the winter food) is undesirable. Much damage has also been sustained by *Abies balsamea* (a highly preferred food), *Sorbus americana*, *Salix* spp. and *Taxus canadensis*, all of which are being considerably reduced.

2282. ADAMS, L. **White-tailed deer browsing on natural conifer seedlings.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 105, 1951. pp. 3.

In 1946, 7 plots in Ponderosa Pine forests were enclosed against deer, and comparable control plots were demarcated but left unfenced. In 1951 a total of 114 Ponderosa Pine and 197 Douglas Fir seedlings were found on the fenced plots, as against 18 and 68 respectively for the unfenced plots. [Cf. *For. Abstr.* 13 (No. 451).]

453. *Insects*

See also No. 2562.

2283. LAIDLAW, W. B. R. **A preliminary enquiry into the influence of solar radiation on insect environment.** *Transactions of the Society for British Entomology, Bournemouth* 11 (2), 1951 (20–80). 23 refs. I.I.E.

Includes a section on silvicultural causes of forest insect epidemics and their prevention by regulating illumination; this part of the paper is also published in *Quart. J. For.* 46 (1), 1952.

2284. SHEPARD, H. H. **The chemistry and action of insecticides.** McGraw-Hill Book Co., Inc., New York. 1951. pp. viii + 504. Many refs. Price $7·00 [59*s.* 6*d.*]

Contains chapters on the following: As compounds; F compounds; S and its compounds; Cu compounds; miscellaneous inorganic and metal-organic substances; plant products; nicotine and other alkaloids; pyrethrins, rotenone, and miscellaneous plant extractives; petroleum, animal and vegetable oils, soaps, creosotes; synthetic organic insecticides; chemical control of insects: general aspects; relative toxicity and mode of action of insecticides; attractants and repellents.

2285. NEVES, C. M. BAETA. **Alguns aspectos ingratos no emprego dos insecticidas orgânicos sintéticos.** [**Some adverse aspects of the use of synthetic organic insecticides.**] *Agros* 34 (4/5), 1951 (211–34). 51 refs. [Port.] A.P.B.

A review, based on world literature, of the action of such insecticides on parasites and predators, disturbances of the biocoenosis which may result from aerial spraying, and effects on bees and other pollen-carrying insects.

2286. YUILL, J. S., EATON, C. B., and ISLER, D. A. **Airplane spraying for forest pest control.** *Mimeo. U.S. Bur. Ent.* No. *E*-823, 1951. pp. 21.

Summarizes the present state of knowledge under the following heads: advantages and limitations of aerial spraying; types of aircraft; spray equipment; spray mixtures; spraying operations; evaluating results; and precautions in the use of DDT. There are two appendixes: (1) specifications for spray materials; (2) estimating deposit and atomization.

2287. LANGFORD, G. S. **Some insects of Elm and Oak.** *Arborist's News, Wooster* 15 (12), 1950 (137–43). L.S.

General information on control of Oak and Elm pests with particular reference to spraying, and with a list of pests, classified under the times of year when control measures are most effective.

Isoptera

2288. **Termites.** *Rep. For. Dep. Uganda 1950*, 1951 (16).

DDT was used successfully to poison termitaries in Eucalypt plantations, which suffer severely from termite attack. Where 4 holes were made in each otherwise untouched termitary and DDT inserted, the cost was 21s. 47 cents/acre compared with 31s. 73 cents/acre for levelling termitaries and removing queens (reckoning 4 termitaries per acre in each case), and no regeneration of termites was observed.

Hemiptera

See also Nos. 1839–40.

2289. WAY, M. J. **An insect pest of Coconuts and its relationship to certain ant species.** *Nature, Lond.* 168 (4268), 1951 (302–3). 8 refs.

Cf. *For. Abstr.* 13 (No. 1413).

2290. BRADLEY, G. A. **Boxelder aphid, *Periphyllus negundinis* (Thomas).** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (2).

Mortality of more than 98% was obtained by the use of the following sprays: BHC (wettable powder 6% γ-isomer) 5 lb./½ gal. oil; Lindane (a γ-BHC formulation) 4 oz.; DDT (25% emulsifiable concentrate) 2½ pints; Parathion (diethyl paranitrophenol thiophosphate; 25% wettable powder) 1 lb.; and TEPP (tetraethyl pyrophosphate; 40% emulsifiable concentrate) 12·5 oz.; all quantities per 100 gal. water.

2291. ROBERT, A. **Note sur deux kermès de l'épinette: *Adelges abietis* L. et *Physokermes piceae* Schr.** [**Note on *A. abietis* and *P. piceae*.**] *Annales de l'ACFAS, Montréal* 15, 1949 (86–8). [F.] L.S.

Observations on the life history of these pests of *Picea abies*.

2292. BAGGIOLINI, M., GEIER, P., and MATHYS, G. **Contaminabilité par le pou de San-José (*Quadraspidiotus perniciosus* Comst.) des végétaux ligneux les plus communs en Suisse.** [**Susceptibility of the most common woody species of Switzerland to infection by the San José scale.**] *Annu. agric. Suisse* 1951 (9/10), (931–7). 3 refs. [F.] E.M.B.

Lists primary and secondary hosts of *Aspidiotus perniciosus*, including several forest and ornamental species.

2293. PLUMB, G. H. **A new and serious insect pest of Red Pine.** Connecticut Agricultural Experiment Station, New Haven. 1950. pp. 4.

Describes a scale insect (*Matsucoccus* sp.) that has been found infesting and killing plantations of *Pinus resinosa* in Connecticut.

Lepidoptera

See also Nos. 2012, 2072–3, 2708.

2294. GRAHAM, K., and SHEPHERD, R. **Population measurement of the Lodgepole needle miner and its parasites.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (4), 1951 (3–4).

This miner [*Recurvaria milleri*] is especially suitable for population studies because in the needles it has relative fixity of abode, and because the branch tips of Pine constitute a natural and convenient sampling unit. The ultimate sampling unit consists of branch tips bearing the last 5 years' needles, the normal foliage complement for Lodgepole Pine in the area studied [Banff National Park]. The needle-miner population in a tree is expressed as the average number of larvae per branch tip, and the estimate can be made within the limits of any prescribed sampling error. To complete the information for a census, it was necessary to determine the number of branch tips per tree in each (5-ft.) height class (data tabulated and shown graphically), and the number and height of trees/acre.

In the experimental stand (588 trees/acre) there were ca. 1,000,000 branch tips/acre. With an average of 35 larvae per tip in 1949, this represented a population of 35,000,000 needle miners/acre. Where parasitization was ca. 20%, the number of parasites was at least 7,000,000/acre and in some cases must have been considerably more. It is apparent that, in an area with such populations as this, the release of parasites of the same species as are already native to the area, could not be undertaken on a scale that would affect the course of an outbreak involving some 250,000 acres of forest. This does not necessarily apply, however, to the introduction of exotic species of parasite.

2295. SILVER, G. T. **The Arborvitae leaf-miners.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (1).

Three species of leaf-miner (*Argyresthia thuiella*, *A. freyella*, and *Recurvaria* sp.) are responsible for considerable damage to *Thuja occidentalis* in New Brunswick and Maine. Several dead trees have been found in areas of heavy infestation and the miners probably contributed to their death, but it is doubtful whether the insects can kill vigorous trees. DDT and Pb arsenate applied as a spray at 5 lb./100 gal. gave satisfactory control. Parasitization was high.

2296. DAVIAULT, L. Notes sur la biologie et les parasites du porte-case du mélèze (*Coleophora laricella*) dans la province de Québec. [**The biology and parasites of *C. laricella* in Quebec province.**] *Annales de l'ACFAS, Montréal* 15, 1949 (90–2). [F.] L.S.

2297. CROOKE, M. **A contribution to the knowledge of the genus *Evetria* Hbn. (Lepidoptera, Tortricoidea).** *Forestry* 24 (2), 1951 (127–46 + 8 photos). 22 refs.

Discusses the species belonging to the genus *Evetria* which are of interest and importance in British forestry. These are: *E. buoliana*, the Pine shoot moth; *E. turionana*, the Pine bud moth; *E. resinella*, the Pine resin-gall moth; and *E. purdeyi*, the Pine leaf-mining moth. The main morphological features of all stages of each of the four species are described. Details of the biology, the damage inflicted on individual host trees, and the forest status of each species are given and suggestions for control, based mainly on silvicultural techniques, are advanced. *From author's summary.*

2298. RUDOLF, P. O. **Red Pine and the European Pine shoot moth in southern Michigan.** *Pap. Mich. Acad. Sci.* 35, 1949 (1951), (61–7). 5 refs. L.S.

A brief account is given of the habits of *Rhyacionia buoliana* and of the areas of infestation in Michigan. A study was made of temperatures within the last 20 years in Lower Michigan to find where cold weather capable of curtailing the spread of the moth occurs, and a map is presented showing for this period the following 5 zones: (1) lethal temperatures (– 18° F. or lower) occurring once or not at all. Severe infestations may be expected. (2) Lethal temperatures 1–3 times. Also a zone of severe infestation, though spread is more retarded than in (1). (3) Lethal temperatures 3–5 times. Local infestations heavy, but do not spread easily. (4) Lethal temperatures 5–10 times. Local infestations may be heavy, but little opportunity of extensive serious attacks or spread to new localities. (5) Lethal temperatures 10 or more times. Little opportunity for the insect to establish itself.

Control measures (briefly described) include the destruction of infested twig tips and chemical spraying. *Pinus resinosa* should not be planted in the southern part of Lower Michigan, except in zone-3 areas, without constant supervision and control. It should not be planted on poor sites, nor in close association with *P. mugo*, the preferred host.

2299. PRENTICE, R. M. **Further notes on the large Aspen tortrix.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (2).

Notes on the life history of *Cacoecia* (*Archips*) *conflictana*, a pest of *Populus tremuloides* in the Prairie Provinces.

2300. DURINOV, S. A. Elovyĭ želtohvost—opasnyĭ vreditelj hvoĭnyh porod. [***Dasychira abietis*—a serious pest of conifers.**] *Lesn. Hoz.* 3 (7), 1950 (69–70). [Russ.]

Reports briefly on an outbreak in 1948 in the valley of the Barguzin River, Buryat-Mongolia, with descriptive notes on the imagos, larvae, pupae, eggs and larval excrement of this moth. Mass flights occurred during 10–25 July, or earlier on southern and later on northern aspects. Eggs were laid, 2–3 hours after emergence from the pupa, on branches and foliage. They hatched in 15–20 days and the larvae fed until the start of the frosts, doing little damage at this stage, as they ate only the edges of the needles. After overwintering at a depth of 5–18 cm. in the forest floor, they emerged in late April to early May and caused serious defoliation before pupating in the second half of June. Pine and Larch are the chief species attacked, the defoliation proceeding upwards from the base of the crown. The centres of mass reproduction are

mostly in Pine stands at the polewood stage. Isolated trees with well developed crowns were not attacked, and no attack was observed on hardwoods.

2301. Études forestières: entomologie. [**Forestry studies: entomology.**] *Rapp. Fonds for. nat. Jan./Dec. 1949*, 1950 (29). [F.]

The resistance of *Thaumetopoea pityocampa* larvae to several insecticides was tested in rearing cages (40 larvae in each test). (1) Parathion (0·5–0·8% of active substance) caused 90% mortality in 48 hours. (2) Rotenone (0·7%) + pyrethrin (0·1%) caused 50% mortality. (3) TTC (active principle 'lithiocarbonate de chlorocyclohexane' [?]), DDT (12%) and BHC (10%) gave identical results, rather less effective than (2).

Coleoptera

See also Nos. 1841, 2072, 2555, 2564–5, 2708.

2302. LENGERKEN, H. VON. Zur Brutbiologie des Pappelblattrollers (*Byctiscus populi* L.). [**The breeding habits of *B. populi*.**] *Z. angew. Ent.* 32 (4), 1951 (599–603). [G.]

Observations on its leaf-rolling activities.

2303. GRAHAM, K. **The Sitka Spruce weevil.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (3–4).

Analysis of data on distribution of attacks by *Pissodes sitchensis* among trees in a stand, showed that many more trees escaped attack than could be accounted for by chance alone (25 against an estimated 3·14 according to the Poisson distribution). The high degree of conformity of actual distribution with Neyman's contagious distribution (25 and 25·2 respectively), however, suggests that the non-randomness may reflect a characteristic in the distribution of the weevil population rather than host preference.

2304. HEQVIST, K.-J. Ögonvivlar som bokplantsskadegörare. [**Damage to Beech seedlings by *Strophosomus rufipes*.**] *Svenska Skogsv-Fören. Tidskr.* 49 (2), 1951 (216–20). 14 refs. [Sw.g.]

In 5 ha. of forest land in S. Sweden, 22·3% of Beech seedlings were damaged and in most cases killed by *S. rufipes* or, less often, by *S. melanogrammus*.

2305. RYVKIN, B. V. Pričiny obrazovanija koroednyh očagov v Vjalovskom Gosudarstvennom zapovednike. [**Reasons for the development of foci of barkbeetle infestation in the Vyalov State Forest Reserve.**] *Priroda, Moskva* 40 (8), 1951 (80–1). [Russ.] A.P.B.

This forest (54°–54° 45′ N. lat., 26° 30′–26° 45′ E. long.), now in the Belorussian S.S.R., was formerly part of Poland and belonged to a private estate. In 1929 its owner fenced and stocked with deer an area of 375 ha., and this was declared a reserve when the region passed into Belorussian hands. The fence was destroyed by the Germans during World War II and many deer were killed. After the war, when the area of the reserve was enlarged to 4,100 ha. much infestation by barkbeetles and other secondary pests was discovered. The chief pests of Norway Spruce were *Polygraphus polygraphus, Ips typographus* and *Rhagium inquisitor*. Insect attack began low down the bole and progressed upwards. Almost all the affected trees showed traces of deer barking (horn-rubbing), which had given entry to fungi and finally resulted in much windthrow and breakage, thus providing material for the beetles to breed in. In Scots Pine, deer barking is confined to thin-barked trees of small diameter. Insect attack, starting in the lower crown, was chiefly by *Pityogenes bidentatus* and *P. quadridens*, which characteristically infest Pine of small diameter. In the next year after colonization by these species, the trees are attacked by *Blastophagus piniperda* and *B. minor*. Deer damage during 1929–41 appears to be the primary cause of the beetle infestations. Since the deer have been allowed to roam the whole area, no important fresh damage has occurred.

2306. KELLOGG, R. S. **Yellow Pine in the Bahamas.** *J. For.* 49 (11), 1951 (795–6).

Death of *Pinus caribaea* in the Bahamas was found to be due to attack by unidentified barkbeetles following on an unusually dry winter.

2307. THOMSON, M. G., and WALTERS, J. **Engelmann Spruce bark-beetle.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (5), 1951 (3).

A relationship was found between the d.b.h. of Engelmann Spruce and the probability that a tree would be killed by *Dendroctonus engelmanni*. Over 1,000 trees in the centre of a barkbeetle outbreak were tallied by 1-in. diameter classes according to whether they had been killed, had recovered from barkbeetle attack, or were unattacked, and the probability of death was then calculated. When probability of death was plotted against the logarithm of d.b.h., a close correlation was apparent.

Hymenoptera

See also Nos. 1839, 2072.

2308. ZAHAROV, P. S. Sinij rogohvost—vreditelj sosny stepnyh lesničestv. [***Sirex juvencus*, a pest of Pine in the steppe forest districts.**] *Priroda, Moskva* 40 (8), 1951 (47–9). [Russ.] A.P.B.

S. juvencus is one of the most serious pests of Pine plantations on sandy soils in S.E. Russia. Studies in the Rostov region have shown that its flight period starts about mid-August and lasts till mid-September, the life cycle being completed here in a single year, though in some cases a diapause occurs and the cycle is then longer. Attacks are chiefly on Scots Pine, but sometimes on other species. Oviposition is described and imagos, pupae, larvae and larval galleries are illustrated by line drawings. Rimskiĭ-Korsakov's statement that the larvae, after boring into the heartwood, turn round and return, eating their bore-dust on the way, is contradicted by the regular and continuous increase in the diameter of the galleries from their starting point to the exit holes, which are 3–6 mm. in diameter. Eggs were observed to be laid on the wood of quite healthy trees, and the insect must be regarded as a primary pest. Cases are known where infested timber has been used in buildings, resulting in secondary

attacks on wooden flooring and other materials, e.g. linoleum. The only control measure practicable at present is timely thinning to remove all trees showing signs of attack. Such material should on no account be used for buildings but converted to fuel-wood and burnt as soon as possible.

2309. SCHAFFNER, J. V. JR. **The red-headed Pine sawfly [*Neodiprion lecontei*].** *Leafl. U.S. Dep. Agric.* No. 296, 1951. pp. 4.

Description and methods of control by DDT or Pb arsenate sprays.

2310. ZUNINO, H. A. Empleo del hexaclorociclohexane en la lucha contra las hormigas podadoras. **[The use of BHC in the control of leaf-cutter ants.]** *Idia* 14 (37/39), 1951 (7–9). [Span.] C.G.B.

Experiments were made both in the laboratory and in the field to test the action of various kinds of BHC preparation on *Acromyrmex lundi, A. striatus* and some other ants. Unless the preparation reaches the interior of the nest the whole colony cannot be destroyed. Either a 20% powder used as a dust, or a solution of 50% wettable powder (100 g. in 10 litres water) with the addition of a wetting agent, have proved fully adequate when injected well into the nest.

Diptera

2311. Rótarskemmdir á birki. **[Damage to Birch roots.]** *Ársr. Skógræktarf. Íslands 1950*, 1951 (142–3). [Ice.]

Birch nursery stock, especially in S. Iceland, has been damaged lately by larvae feeding on the root bark: trees attacked lost their leaves, and tended to snap at the root collar. The larvae have been identified as those of *Bibio nigriventris*. To prevent the flies from laying their eggs near young Birches, dusting the beds with γ BHC in late May or June, and again some weeks later, is recommended.

459. *Other Animals*

2312. TURICA, A. Comprobación de un ataque de *Heterodera marioni* Goodey a sauce-álamos del Delta. **[Confirmation of an attack of *H. marioni* on *Salix alba* var. *caerulea* in the [Paraná] Delta.]** *Idia* 4 (42/43), 1951 (5–6). 2 refs. [Span.] C.G.B.

Retarded growth in *Salix alba* var. *caerulea* proved to be due to the root-rot nematode *Heterodera marioni*. Symptoms of attack are briefly described. *Populus* 'A.M.' growing in close association with the Willow remained untouched.

2313. SCHREAD, J. C. **Spruce mite control.** *Circ. Conn. agric. Exp. Sta.* No. 180, 1951. pp. 11.

Chemical control of *Paratetranychus ununguis* on Spruce seedlings in the nursery was best effected by spraying with Aramite (chloroethyl butylphenoxy methyl ethyl sulphite).

46. DAMAGE TO TREE GROWTH BY MAN

See also Nos. 1999, 2170, 2260.

2314. ROTH, C. Nährstoffentzug an Waldböden durch Seegrasgewinnung. **[Removal of nutrients from forest soils through the collection of sedge.]** *Schweiz. Z. Forstw.* 102 (12), 1951 (644–8). [G.f.]

Carex brizoides, a characteristic species of the *Querceto-Carpinetum aretosum* and the *Querceto-Carpinetum caricetosum* in the upper Aargau, is much used by saddlers as a cheap stuffing material. The author has shown, however, that removal of this sedge considerably impoverishes the soil, since it annually takes from it 8½ times as much K and 1½ times as much P and Ca as a forest stand. This loss is the more serious since the soils in question are already poor in these substances. Collection of the sedge also often causes mechanical damage to reproduction.

2315. FENTON, R. H. **Unusual cause of death in Red Pine plantation.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 2, 1951 (1–2).

Cores taken in 1950 from two unhealthy trees in a 20-year-old Red Pine stand showed that $ZnCl_2$ was present in the wood. In 1949, green thinnings were treated with $ZnCl_2$ by a sap-stream method of preservation and it appears probable that the containers leaked, or that some of the chemical was spilt, entered the soil, and was taken up by the trees.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

See also No. 2260.

2316. JACKSON, L. W. R. **Effect of littleleaf disease on growth of Shortleaf Pine.** *J. For.* 49 (11), 1951 (778–9). 3 refs.

During 1949, a dendrometer study was made of the radial growth at breast height of 12 diseased and 12 healthy Shortleaf Pines near Athens, Georgia. All the trees were dominants, with adequate growing space, in a 50-year-old, old-field stand. It was evident from the data obtained, that littleleaf disease had no observable effect on initiation of cambial activity, periodicity of growth, or length of the period of most rapid growth. Diseased trees showed, however, a marked decrease in the amount of total radial growth, which was only 52% of that of healthy trees. Throughout the growing season, the cumulative growth of the diseased trees for each period of measurement varied within the narrow range of 50–58% of that of healthy trees. There was no evidence of a gradual decline in the rate of growth of diseased trees during a single growing season.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

See also No. 2354.

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

521. *Diameter (Girth) and Sectional Area*

2317. Stoeckeler, J. H., and Stoltz, E. R. **Caliper-gauges for measuring diameters of small trees.** *J. For.* 49 (10), 1951 (738–9).

Describes (with photographs) three gauges developed at the Northern Lakes Forest Research Centre, Rhinelander, Wis.

2318. McLintock, T. F. **Stump diameter related to d.b.h. for Spruce-Fir region.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 4, 1951 (3–4).

Gives a table based on measurements of 268 Spruce and 804 Fir trees showing, by inch classes, stump-diameter/d.b.h. equivalents (and vice versa) for the Spruce/Fir region.

522. *Height, Length*

2319. Stoffels, A. De hoogtekromme en de gemiddelde hoogte van een opstand. [**The height curve and the mean height of a stand.**] *Ned. Boschb.-Tijdschr.* 22 (4), 1950 (97–103). 8 refs. [Du.e.]

523. *Bark*

See also No. 2329.

2320. Gevorkiantz, S. R., and Olsen, L. P. **Bark percent in Lake States trees.** *Tech. Note Lake St. For. Exp. Sta.* No. 362, 1951. pp. 1.

Tabulates figures showing the bark as a % of the total volume o.b. in pole timber (4–10 in.) and sawtimber (12 in. and over) for 9 softwood and 15 hardwood species.

2321. Chamberlain, E. B., and Meyer, H. A. **Bark volume in cordwood.** *Tappi* 33 (11), 1950 (554–5). 2 refs. P.R.

The bark volume percent of unbarked wood is given by the formula $80\ (1 - k^2)$, where k is the average ratio of diameter u.b. to diameter o.b., the bark thickness being measured with a bark gauge. Values of k for 30 piles of various Pennsylvania hardwood and softwood species are tabulated.

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

See No. 2341.

524.3. Volume of Tree Groups and Stands

See also No. 2345.

2322. Cantiani, M. Tavola cormometrica del abete bianco dell'Alto Molise. [**Volume table for *Abies alba* in upper Molise.**] *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (18–20). [It.f.e.g.]

2323. Antoniotti, G. B. Tavola dendrometrica delle matricine di cerro dei boschi cedui del Molise. [**Volume table of *Quercus cerris* reserves in the coppice of Molise.**] *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (5–7). [It.f.e.g.]

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

2324. Quint, P.-L. Reconnaissance des forêts tropicales en vue de la production de la cellulose. [**Enumeration surveys of tropical forests with a view to pulp production.**] *Bois For. Trop.* No. 18/19, 1951 (100–6 + 4 dgms.). [F.e.span.]

Describes in detail some trial enumerations undertaken in Gabun forests, in order to determine the species, and their proportion by volume, which heavy exploitation could make available to a pulp mill. In the first trial a 20% enumeration of 2,400 ha. was carried out. The area was first divided by a grid, and 4 sample strips marked out in each 25-ha. square [cf. *For. Abstr.* 11 (No. 3379)]. In each strip, all the trees were listed by species, d.b.h. (calipered) and timber height in 2-m. classes (estimated by eye). The volume of each species was calculated and the total volumes were divided into 3 size groups—15–40 cm., 45–60 cm., and over 60 cm. in diameter. These data were grouped for analysis by 3 blocks of 800 ha. each.

A measure of quantitative distribution was required to distinguish the most abundant species from others. It was decided that for each species this was a function of 3 factors, to each of which an arbitrary limit was assigned. The factors and limits were: (1) the % of strips in which the species occurred—over 75%; (2) the average number of individuals per unit area—2 per ha. and upwards; (3) the average volume per unit area—2 cu.m./ha. and upwards. This combination of factors permitted the elimination of species which, though well represented in all strips, occurred only as small trees with little usable volume, as well as of species which made up a considerable volume per unit area in virtue of a few, very large, isolated individuals. A remarkable correspondence was found to exist between the 3 factors. With rare exceptions, all the species represented on more than 75% of the strips had an average of more than 2 individuals per ha., making up an average volume of more than 2 cu.m. The total number of species per block varied from 80 to 96, but of these dominant species from 16 to 17 only, and in each block their combined volume was 82–85% of the total volume. Thus exploitation of a relatively small number of species with which to make up mixtures for pulping, would permit the utilization of more than 80% of the standing volume.

In a second trial a 1% enumeration of 10,000 ha. gave very similar results to the 20% enumeration of 2,400 ha.

2325. **Enumerations.** *Rep. For. Dep. Uganda 1950*, 1951 (6–8).

The following sampling methods have been tried: (1) Plots situated randomly, 1 per 20-acre cell of an imaginary grid covering the forest, located by the most conveniently placed cut lines that were possible in the circumstances. (2) Plots situated as in (1) but with an additional plot in each cell situated randomly on a transect itself random along a base-line. (3) Plots situated 2 per 40-acre grid cell, situated randomly, 2 per 20-chain length of transects themselves 1 per 20-chain length of base-line. (4) System (3) doubled by randomizing 2 transects per 20-chain length of base-line, giving 4 plots per 40-acre grid cell. (5) Plots in continuous transects (i.e. transects interrupted at intervals equal to the original plot lengths) which are situated randomly one per 20-chain length of base-line. Preliminary analysis indicates that system (3) is the cheapest for its efficiency over large areas of forest, while system (5) is both cheapest and most efficient over small areas. System (4) is the most efficient absolutely and is probably the best for intensive research work.

2326. ULLÉN, G. Linjetaxering av skog. **[Strip surveys of forests.]** *Svenska SkogsvFören. Tidskr.* 49 (1), 1951 (100–6). [Sw.]

Results of a pilot survey with strips 4 m. wide instead of the usual 10 m. showed that sufficient accuracy can be obtained with the narrower width. One of the two caliper men, moreover, can be dispensed with. Two crews took part in the experiment, each consisting of 6 men. A total length of 68,620 m. was surveyed by the two crews in 11 days, giving an average of 6·2 km. a day.

525. *Volume by Assortments. Merchantable Volume*

See also Nos. 2255, 2344–5.

2327. ANTONIOTTI, G. B. Tavola dendrometrica del faggio del Molise cresciuto in fustaia disetanea. **[Assortment volume table for Beech grown in uneven-aged forest in Molise.]** *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (12–7). [It.f.e.g.]

2328. ANTONIOTTI, G. B. Tavola dendrometrica del cerro del Molise cresciuto in fustaia coetanea. **[Assortment volume table for *Quercus cerris* grown in even-aged forest in Molise.]** *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (8–11). [It.f.e.g.]

527. *Solid Volume of Stacked Products*

See also No. 2321.

2329. REINHOLD, M. Die Inhaltszahlen von Schichtnutzholz. (Ihre Ermittlung und ihre Gesetzmässigkeiten.) **[The solid contents of stacked timber. (Their determination and correlations).]** *Forstwiss. Cbl.* 70 (9), 1951 (566–77). [G.g.]

Presents: (1) Formulae for determining the cubic content of stacked timber bolts. The correlation of the cubic content with (*a*) length and (*b*) diameter of the bolts is discussed. (2) Formulae for determining the volume of stacked cleft timber (Beech). The relationship of the volume of stacked bolts to that of cleft timber is discussed. (3) Methods of calculating bark % (*a*) as loss in diameter, and (*b*) as loss in volume. (4) Formulae for calculating the number of bolts per stacked cu.m.

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

2330. COLETTE, L. Le développement du hêtre-type en futaie jardinée. **[Development of the typical Beech-tree in selection forest.]** *Bull. Soc. for. Belg.* 58 (10), 1951 (415–20). [F.]

A number of Beeches of all sizes, both felled and standing, were measured in a Beech forest in the Ardennes, and from the data so obtained, typical dimensions for well developed trees of 4 girth classes (g.b.h. 0·65, 1·10, 1·65 and 2·35 m. respectively) were deduced. For each of these classes the following data are given: d.b.h., crown diameter/d.b.h., crown length/total height, crown length/crown diameter. In normally developed trees the ratio crown diameter/d.b.h. (D/d), which is highest in small trees, becomes constant at a value of 20 in the 1·65 girth class, and marking should aim at giving trees the necessary space to develop their crowns in accordance with this coefficient. The definitive clear length of bole is attained at about the same age as the stabilization of the ratio D/d; by this time the process of natural pruning is completed, and first thinning should be carried out so that the ratio D/d may not fall below 20. The basal area to be aimed at in order to permit proper crown development and adequate regeneration is 22 sq.m./ha., and exploitable size should be g.b.h. 2·20 m. (giving an exploitable age of about 160).

54. ASSESSMENT OF SITE QUALITY

See also Nos. 1809–16.

2331. WILDE, S. A., and PRONIN, D. T. **Growth of Trembling Aspen in relation to ground water and soil organic matter.** *Proc. Soil Sci. Soc. Amer. 1949* 14, 1950 (345–7). 5 refs. L.S.

Rate of growth of *Populus tremuloides*, from 22 to 27 years old, was measured on 22 sample plots in Wisconsin during 1947. Present and expected yields were determined on the basis of available tables. The depth to the upper limits of the deoxidized zone (gley horizon) indicating the prevailing position of the ground-water table was established on each sample plot, and samples from the 7-in. surface layer of soil were analysed for organic-matter content. The results are incorporated in a nomograph, constructed on a pattern of logarithmic curves by empirical trials. According to this, Aspen on soils with the groundwater table at a depth of 52 in. and an organic-matter content of 2·5% shows an average height growth of 18 in. per year; this corresponds to site index 50 and an expected yield of 10 cords/acre at 40 years. On the other hand, Aspen on soils with the groundwater table at a depth of 36 in. and an organic-matter content of 3·5% shows an average height growth of 22 in. per

year; this corresponds to site index 60 and an expected yield of fully stocked stands of ca. 25 cords at 40 years. In 1948 the study was repeated on 18 additional sample plots. Actual rates of growth compared closely with those predicted on the basis of the nomograph in a large number of cases.

2332. YOUNGBERG, C. T., and SCHOLZ, H. F. **Relation of soil fertility and rate of growth of mixed Oak stands in the driftless area of southwestern Wisconsin.** *Proc. Soil Sci. Soc. Amer. 1949* 14, 1950 (331–2). 6 refs. L.S.

A marked correlation was found between the rate of forest growth and content of total replaceable bases in the soil. In deep weathered soils a close correlation was also observed between organic-matter content and base-exchange capacity. Determination of these two factors, plus the soil pH, provides reasonably reliable criteria of soil productivity.

2333. EINSPAHR, D., and MCCOMB, A. L. **Site index of Oaks in relation to soil and topography in Northeastern Iowa.** *J. For.* 49 (10), 1951 (719–23). 15 refs.

In a study of stands aged 60 years and over, on 10 soil series, site index was found to be correlated with depth and certain physical properties of the soil, aspect, and gradient; the governing factor was apparently available soil moisture.

2334. AREND, J. L., and GYSEL, L. W. **Some effects of soil and topography on Oak yields in southern Michigan.** *Tech. Note Lake St. For. Exp. Sta.* No. 365, 1951. pp. 1.

Tabulated figures are given showing yields from average trees of Red and Black Oak (1) on level ground, and (2) on the upper, middle and lower slopes of moderate or steep gradients, for heavy, medium and light soils.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 1985, 1995–6, 1998, 2000, 2021–2, 2026–7, 2030, 2039–40, 2089–90, 2115–6, 2119, 2130, 2153, 2156, 2158–9.

561. *Increment in Height, Diameter, Basal Area, Form and Quality; Variations and Trends; Dendrochronology*

See also No. 1959.

2335. EKLUND, B. Undersökningar över krympnings- och svällningsförändringar hos borrspån av tall och gran. **[Investigations on shrinkage and swelling in increment cores of Pine and Spruce.]** *Medd. SkogsforsknInst., Stockh.* 39 (7), 1951. pp. 59. 16 refs. [Sw.sw.e.] Price *Kr.* 1.

Cores taken at breast height from 361 Scots Pines and 420 Norway Spruces from different parts of central Sweden, were measured immediately after extraction, after 6 months' storage had rendered them air-dry, and then after soaking for 15 and 60 min., and for 24 hr. Results are shown in graphs and tables. The shrinkage % was greater for Pine than for Spruce and for sapwood than for heartwood. Sapwood shrinkage showed the greatest variations. After soaking for 15 min. only an insignificant amount of shrinkage remained in the sapwood of both species, but considerable residual shrinkage in the heartwood, especially of Pine. Soaking for 1 hr. reduced shrinkage in heartwood to a satisfactory extent. The time of boring, during the 6 summer months, and the moisture content of the green core, did not appear to affect the degree of shrinkage. This tended to decrease with increasing annual-ring breadth, except in the narrowest rings, where the tendency was reversed. Residual shrinkage of Pine heartwood after 15 minutes' soaking was high for all ring widths. The narrowest annual rings, except those of Pine heartwood, swelled after 15 minutes to a width exceeding that of the rings in the green cores. Radial shrinkage of both species was greater in early than in late wood. The use of a wetting agent in the soaking processes did not appreciably hasten swelling.

2336. MILLER, C. W. **Growth data from nine sections of *Acer saccharum* from Montgomery County, Indiana.** *Butler Univ. bot. Stud.* 10, Pap. No. 2, 1951 (12–9). 4 refs. A.P.B.

Growth rings from sections of *A. saccharum* cut in 1940 were correlated with rainfall data, in order to find the growth/rainfall trend coefficients, i.e. % of agreement in the year-to-year changes in rainfall and growth. The June–July rainfall period shows the closest agreement.

562. *Volume Increment*

2337. NYYSSÖNEN, A. Havaintoja metsikön kasvun arvioimistavoista. **[Observations on methods of estimating the growth of a stand.]** *Metsät. Aikak.* 1951 (6), (167–71). [Fi.e.]

Different methods of estimating the growth of single stands are compared. Numerous standing sample trees were measured in 100 stands, and growth figures calculated from varying numbers of sample trees are compared with average growth figures for corresponding stands obtained from Ilvessalo's yield tables. Conclusions drawn include the following: (1) The number of sample trees necessary does not depend on the age of the stand. (2) When the growth of a single stand is to be estimated, at least 10 sample trees should be measured. (3) In Spruce stands more sample trees must be measured than in Pine and Birch. (4) For an individual stand, measurement of as few as 3 sample trees gives more accurate results than the use of yield tables.

564. *Forecasting Increment*

2338. ROE, A. L. **Growth tables for cut-over Larch/Douglas-Fir stands in the upper Columbia basin.** *Sta. Pap. Nth. Rocky Mt. For. Range Exp. Sta.* No. 30, 1951. pp. 24. 3 refs.

Tables for predicting the growth of residual trees (shelterwood, seed trees or reserves left in partially cut stands) after logging.

2339. ROE, A. L. **Growth tables for selectively-cut Ponderosa Pine in western Montana.** *Sta. Pap. Nth. Rocky Mt. For. Range Exp. Sta.* No. 32, 1951. pp. 16.

Presents, with methods for their use, a set of tables for predicting the growth of residual trees after logging. The tables are based on data obtained from analysing growth responses to different intensities of felling on 60 half-acre temporary sample plots.

566. *Yield Tables and Their Construction*

See also No. 1995.

2340. PETTERSON, H. Produktionstabeller för vissa typer av svensk barrskog. [**Yield tables for certain types of Swedish coniferous forest.**] *Medd. SkogsforsknInst., Stockh.* 40 (9), 1951. pp. 16. 2 refs. [Sw.e.] Price *Kr.*1.

The tables are the result of statistical treatment of data from the Institute's permanent thinning plots from 1902 to 1940, for natural Pine in N. and S. Sweden, and for planted Spruce in S. Sweden. They include data on number of stems, basal area over bark, volume under bark, thinning % and net value.

2341. ANDERSEN, M. **Form factor investigations and yield tables for Japanese Larch in Denmark.** *Forstl. Forsøgsv. Danm.* 19 (5), 1950 (331–410). 35 refs. [E.dan.]

A preliminary account of this study [see *For. Abstr.* 11 (No. 2358)] was given at the 3rd World Forestry Congress, Helsinki. The present detailed report is divided into two parts: (A) Studies of the form factor in relation to other mensurational characteristics of the trees and stands, from the results of which are developed form-factor and taper tables. (B) The construction of an empirical yield table for quality-class B only, data on other classes being inadequate for the purpose. Since examination of the results shows that the basal-area curve culminates at ca. 19 years and then declines till the 40th year, and since consideration of the relations between basal area and volume increment indicates that this is not the most favourable trend as regards economic yield, the author proposes a modified thinning régime and presents a second tentative yield table embodying this modification.

2342. ANTONIOTTI, G. B. Saggio di una tavola alsometrica delle fustaie di cerro del Molise. [**A tentative yield table for *Quercus cerris* in Molise.**] *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (44–7). [It.f.e.g.]

2343. ANTONIOTTI, G. B. Tavola alsometrica dei cedui di cerro del Molise. [**Yield table for *Quercus cerris* coppice in Molise.**] *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (32–6). [It.f.e.g.]

2344. PATRONE, G. Ricerche dendrometriche sui cedui della macchia mediterranea della Maremma toscana. [**The measurement of coppice yield in the mediterranean maquis of the Tuscan Maremma.**] *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (21–31).

Gives (1) yield of coppice at 9, 12, 15 and 18 years, for 3 quality classes, for *Quercus cerris, Q. ilex, Fraxinus ornus, Arbutus unedo*, and *Erica arborea*, and (2) assortment volume tables for *Q. ilex, Q. sessiliflora* and *Q. cerris* standards over coppice.

2345. BENASSI, L. Ricerche dendrometriche sui boschi cedui di castagno del Mugello. [**Studies in the measurement of Chestnut coppice in Mugello.**] *Ric. Dendrom. Auxom. Ist. Assest. for. Univ. Firenze* No. 1, 1950 (37–43). [It.f.e.g.]

From the data obtained, the author constructs (1) an assortment yield table and (2) a volume table, for Chestnut coppice.

568. *Other Mensurational Studies of Stand Constitution and Changes therein. Distribution of Growth by Tree Classes etc.*

2346. STRIDSBERG, E. Studier över tillväxtens fördelning på dimensionsklasser. [**Studies on the distribution of increment by diameter classes.**] *Svenska SkogsvFören. Tidskr.* 48 (1), 1950 (115–7). 1 ref. [Sw.]

Criticizes some details of Salwén's paper [see *For. Abstr.* 13 (No. 551)] and demonstrates a simpler and more accurate method of calculating net increment per diameter class, with proper allowance for recruitment.

2347. KANTOR, J. O výškové predrůstavosti ve smrkových mlazinach. [**Predominance in height [a study of the movement of tree classes] in Spruce thicket stands.**] *Acta Univ. Agric. Silv. Brno* (*Ser. D*) No. 40, 1949. pp. 128. 13 refs. [Cz.russ.e.]

A detailed study of changes of tree class in Spruce thicket stands (ca. 17 years old at the completion of the study) on 5 areas, each containing at least 100 trees, in the Hády district of the Masaryk Forest. Annual height growth for the 12 years 1936–47 was measured by internode length. The classes recognized were: I—predominants (emergents); II—trees forming the main canopy; and III—the rest, all below the main canopy. Taking all classes together, ca. 50% of the trees maintained their original class position during the period. Trees of classes I and III were the most liable to change: only ca. 33% of the original class-I trees maintained their position, and of class III all but 29% moved up to class II either permanently (for the period) or temporarily. Class II, which contained the majority of the trees, was the most stable: of the original trees of this class 58% maintained their position, the remainder moving up or down. Since class II is the only relatively stable portion of the stand, it is to individuals of this class that most attention should be paid in tending, and emphasis must be placed on quality rather than on height. [Cf. *For. Abstr.* 11 (No. 3385).]

58. SURVEYING AND MAPPING (INCLUDING AERIAL SURVEYS)

581/584. *Ground Surveys*

2348. RASINGER, E. Uporaba ročnih busol v gozdarstvu. [**The use of hand [portable] clinometer-compasses in forestry.**] *Les, Ljubljana* 2 (2), 1950 (25–9). [Sloven.]

Illustrated description of (Swedish) type 15 'Silva', Bessard, and army clinometer-compasses, and their use in forest surveying.

2349. HIDE, R. H. **'To the nearest tenth of an acre'.** *Quart. J. For.* 45 (4), 1951 (227–34). 4 refs.

Describes the 'Hatchet planimeter', its use, and precautions to be taken against certain sources of error. [Cf. *For. Abstr.* 4 (p. 64).]

585/588. *Aerial Reconnaissance and Survey*

See also No. 2580.

2350. GARRARD, C. W. **An annotated bibliography of aerial photographic applications to forestry.** *Bull. N.Y. St. Coll. For.* No. 26, 1951. pp. [2] + ii + 81.

Some 300 references to work done since 1916 are arranged, with cross-references, under 9 subject heads. Locations are indicated for the unpublished work included.

2351. SAMMI, J. C. **The application of statistics to photogrammetry.** *Photogrammetric Engineering, Menasha* 16 (5), 1950 (681–5). L.S.

Discusses some basic problems connected with photo interpretation.

2352. COLWELL, R. N., *et al.* **Uses of aerial photographs in forest protection.** *J. For.* 49 (9), 1951 (630–3).

Abstracts of three of the papers read at a symposium held 5 December 1950, by the American Society of Photogrammetry, dealing respectively with the use of aerial photography in control of forest diseases, fires, and insects.

2353. BILLINGS, W. D., and MORRIS, R. J. **Reflection of visible and infrared radiation from leaves of different ecological groups.** *Amer. J. Bot.* 38 (5), 1951 (327–31). 7 refs. O.B.D.

Monochromatic reflectance from 400 mμ to 1100 mμ was measured by means of a Beckman DU spectrophotometer from the upper leaf surfaces of 20 plant species, selected from 5 environments in the western Great Basin. These ranged from desert to an open subalpine slope, through 3 distinct wooded stations. Four species were chosen from each site. Averages of the measurements were plotted. In general the reflectance curves of green leaves show values of about 5% at 400 mμ, rising to a peak of about 15% at 550 mμ, with a gradual decline to about 5 or 6% at 675 mμ. Above this wave-length, the curves rose steeply to a plateau of approximately 50% reflectance in the infra-red region extending from about 775 mμ to 1100 mμ. The hairs or scales on desert and subalpine species were correlated with higher reflectance in the visible region, but not necessarily in the infra-red region. Averages showed that the desert species reflected the greatest amount of visible radiation, followed by the subalpine, west-facing Pine forest, north-facing Pine forest, and shaded campus species, in that order. In the infra-red region, the differences between groups were not so marked, but the greatest reflectance here also was shown by the desert species with an average value of about 6%. The greatest infra-red reflectance, almost 70%, was measured from the glabrous leaves of the desert peach, *Prunus andersonii*. *From authors' summary.*

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 1994, 2346, 2358.

2354. MACKAY, E. Fundamentos y métodos de la ordenación de montes. **[Fundamentals and methods of forest management.]** Sección de Publicaciones, Escuela Especial de Ingenieros de Montes, Madrid. Vol. 1, 1944. pp. 336; Vol. 2, 1949. pp. 768 + 1 map. [Span.]

The first volume of this manual of forest management is devoted to theory and fundamentals, and deals with the following subjects: the forest as an investment and as a source of revenue, the theory of evaluation, the attainment of maximum yields, management plans, the normal forest, and an analysis and synthesis of management principles. The second and larger volume is divided into 5 parts: (1) introduction; (2) forest inventories; (3) the use of the inventory in management; (4) the management of the timber working circle, including a history of methods up to 1850, a description of modern methods, and the application of these methods in Spain; (5) management of forests for cork and resin.

2355. AHONEN, L. Kestävyys metsätalouden ohjeena. **[The conception of sustained yield in forestry.]** *Metsät. Aikak.* 1951 (6), (165–6). [Fi.e.]

Surveys different conceptions of sustained yield, especially those of Saari [cf. *For. Abstr.* 11 (No. 2383)] and Dieterich [cf. *For. Abstr.* 8 (No. 2817); 11 (No. 2387)] and discusses their value in Finnish forest policy. *From author's summary.*

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also Nos. 2002–3, 2008.

2356. MARTI, L. Állománygazdaságra alapított grafikus hozadékszabályozás. **[Graphical yield regulation based on stand management.]** *Erdész. Lap.* 86 (7; 8), 1950 (194–203; 227–31). [Hung.russ.f.g.]

Describes a method designed to bring all the stands in a forest, differing in rotation, under one common system of yield regulation. (1) For each species a general rotation, and the max. and min. felling ages, are laid down in advance. (2) Enumeration records enable account to be taken of quality, health etc., in fixing a planned felling age and the max. and min. felling ages for the individual stands of each species. (3) The individual stands are tabulated, irrespective of species, into 10-year classes indicating years to elapse before their planned felling age. For each 10-year class the total area and the averages of the max. and min. felling ages are calculated. (4) The basis of regulation is area plus a planned average

rotation for the whole forest. The latter is obtained by dividing (*a*) total area to be cut over during the period, by (*b*) normal annual coupe, i.e. sum of coupes (area/planned felling age) for each stand. Since the area of species on shorter rotations may come up for felling more than once during this period and will be repeated the necessary number of times in the appropriate years-to-elapse classes, (*a*) will be correspondingly larger than the actual area of the forest.

Graphical solution: Years to elapse before felling are shown on the ordinate; and total areas per 10-year class, on the abscissa. The total areas from (3) are plotted against years to elapse, adding to the area for each successive (younger) 10-year class the cumulative area(s) of the preceding class(es). Max. and min. felling ages for each class are similarly plotted. From the origin to the appropriate number of years on the ordinate is drawn a straight line representing the planned average rotation for the forest as a whole. For the correct rotation this line must lie between the plotted max. and min. felling ages. If it intersects either, adjustment must be effected by tracing a straight line that does lie between them, from the origin to a point whence a line satisfying the same requirements can be drawn parallel to that of the planned average rotation, i.e. from this point onwards the latter is once more the basis of regulation.

The general and temporary rotations can be expressed as the tangents of the angles between their respective lines and the abscissa, and the annual coupe as the cotangent of this angle.

A worked example of the method is given.

2357. PETRINI, S. Beräkning av slutavverkningen. [**The calculation of final fellings.**] *Skr. K. Skogshögsk., Stockh.* No. 5/6, 1951 (3–9). [Sw.f.]

Gives formulae for calculating the annual yield and the residual growing stock (if any) in a period of final fellings, assuming that the initial growing stock and increment % are known. The cases considered, with worked examples, are: (1) felling of the whole growing stock within the period; (2) fellings in which seedbearers are left on the coupes; and (3) fellings during a period shorter than that necessary for the substantially complete removal of the growing stock.

2358. Hugstklasser og driftsplaner. [**'Felling classes' and working plans.**] *Tidsskr. Skogbr.* 58 (6), 1950 (130–6). [Nor.]

Working plans of 30 forests are analysed and results are tabulated to show the relationship between annual yield in % of normal increment, and the % division of the area into 'felling classes' [a classification in which I–IV are respectively areas under regeneration; areas satisfactorily regenerated—below thinning but up to cleaning stage; areas of well stocked young forest that have been thinned or are ready for thinning; and areas of well stocked older and mature forest; while V covers areas unsatisfactory for various reasons—e.g. trees too old or damaged, areas insufficiently stocked, or the species unsuited to the site. V*a* indicates areas where stocking is medium to good, and V*b* areas where it is medium to poor. This classification is defined by J. G. Bøhmer in *Skogtaksasjon* [cf. *For. Abstr.* 9 (No. 1925)]. From the figures obtained, a second table groups the data to show the yield in relation to the proportion of the different felling classes present, without calculating the actual volume and increment. The figures for annual yield for 20 forests calculated from this table, were found to be reasonably accurate. The proportions of the felling classes in 5 of the forests are compared diagrammatically with normal forest. [Cf. *For. Abstr.* 13 (No. 2140).]

64. FORESTRY AS A BUSINESS: GENERAL

See also No. 2324.

2359. DIETERICH, V. Die forstliche Betriebswirtschaftslehre als wirtschaftswissenschaftlicher Disziplin. [**Forest management as a branch of economic science.**] *Schweiz. Z. Forstw.* 102 (10), 1951 (502–17). 15 refs. [G.f.]

Cf. *For. Abstr.* 11 (No. 2387).

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 2008, 2022, 2077, 2084, 2115, 2130, 2137, 2139, 2144, 2147, 2180, 2244, 2249, 2375.

2360. PUTNAM, J. A. **The relationship of utilization to silvicultural management in bottomland hardwoods.** *J. For.* 49 (11), 1951 (783–6).

Discusses the necessity for fire protection and improvement cuttings in the bottomland hardwoods of Mississippi, and shows that the possibility of effecting these measures depends on better marketing and fuller utilization.

2361. OOSTING, W. Resultaten van het opwerken van 1e dennendunsel (voorjaar 1951). [**The results of converting the first thinnings of Scots Pine (Spring 1951).**] *Ned. Boschb.-Tijdschr.* 23 (12), 1951 (314–5). [Du.]

Twenty-five-year old Scots Pine was thinned, yielding roughly 90 cu.m. Unsorted, these thinnings were valued at Fl.15–16/ cu.m. but when sorted into 3 classes of poles with diameters of 9–11, 6–8, and 3–5 cm. respectively, and firewood, the average value was estimated at Fl.18/cu.m. Finally, when converted into small assortments including round mining timber, poles for drying racks, stakes, pickets, laths for peat bales and spools for rolls of paper, their average value, after deducting the cost of conversion, was estimated at Fl.25/cu.m.

2362. MAARTMANN, K. Hvor meget bør investeres i skoggrøfting? [**How large a sum should be allowed for forest drainage?**] *Tidsskr. Skogbr.* 59 (3), 1951 (97–102). [Nor.]

Discusses a circular from the Department of Agriculture on state subsidies for forest drainage. Three tables are given, two showing the amount that can be allowed per dekare, for regions with favourable and unfavourable reaction to drainage, according to the average height of the existing stand and the type of peat site to be drained, and the third the cost of maintenance per dekare on different peat sites. It

is emphasized that local conditions in Norway are so variable that the tables can only serve as a general indication.

2363. **Sawmilling royalty determinations.** *Rep. For. Comm. Vict. 1949/50*, 1951 (26).

An agreement has been reached between the Forests Commission of Victoria and the Victorian Sawmillers' Association, for determining royalties on hardwood sawlogs other than Red Gum. The system adopted is based on a fixed minimum royalty (1s./super. ft.) to apply at the centres of production most distant from the principal marketing centre (Melbourne). The royalty rate to be charged to an individual sawmill is based on the minimum rate of 1s. and adjusted by taking into consideration haulage costs for logs and sawn timber, rail freight, quality grades of sawn output, and % recovery of sawn timber from log volume. It is proposed to extend the system, as soon as possible, to Red Gum and plantation-grown softwoods.

2364. HAGBERG, E. Den föreslagna skogsvärderingsmetoden. **[The proposed method of forest valuation.]** *Svenska SkogsvFören. Tidskr.* 48 (1), 1950 (10–23). [Sw.]

Discusses proposed modifications in existing methods of valuation [cf. *For. Abstr.* 7 (No. 1447)] and their effects.

66. COSTING OF LOGGING OPERATIONS

See Nos. 2184, 2193–4, 2203, 2207, 2215, 2217–8, 2361, 2375.

67. ASSESSMENT OF FINANCIAL RESULTS; BOOK-KEEPING AND ACCOUNTANCY; BUSINESS STATISTICS; SHORT-TERM PLANNING AND FINANCING

See also No. 2688.

2365. MACGREGOR, J. J. **Estate accounting and forestry costs.** *Quart. J. For.* 45 (4), 1951 (243–54).

Describes how a system of accounting used on a private estate, can be expanded to provide the costing of forestry operations.

2366. HILEY, W. E. **Dartington Woodlands Limited: an examination of the accounts for the year 1948–49.** Dartington Woodlands Ltd., Totnes, Devon. 1950. pp. 14. Price 2*s*.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

681. *National (Federal, State) Forest Services and Administration*

2367. SACCHI, G. Il corpo forestale dello stato. **[The [Italian] state forest service.]** *Ital. for. mont.* 6 (5), 1951 (209–16). [It.it.f.]

History, duties, and present pay and status.

2368. MENDIA, J. M. DE ALMEIDA DE. **Sôbre os Serviços Florestais. [The Forest Service.]** Sociedade de Ciências Agronómicas de Portugal [Lisbon], 1945. pp. 33 + 2 maps + 3 dgms. + 2 gphs. + 38 photos. [Port.]

A fairly comprehensive account of the history of the Portuguese Forest Service, its organization, the afforestation plan formulated in 1938 and its progress, production of timber and resin between 1938 and 1945, and the progress of Portuguese research.

2369. CHATURVEDI, M. D. **Explanatory memoranda for the Central Board of Forestry.** Ministry of Food & Agriculture, Government of India. 1951. pp. 77.

In order to integrate the forest policy pursued by various states, the Government of India have constituted a Central Board of Forestry, the members of which are the Minister of Agriculture (Central Government), 19 ministers in charge of forests in the individual states, the Secretary to the Ministry of Agriculture (Central Government), the Joint Secretary to the Government of India, the Inspector General of Forests, and the President of the Forest Research Institute, Dehra Dun. The present document contains (1) the Government resolution constituting the Board, (2) agenda for its first meeting (May 1951), and (3) memoranda by the Inspector General on the various items of the agenda. These items are as follows: national forest policy; Van Mahotsava and Van Premi Sangh (the national tree-planting festival and the forest lovers' association); forest education; soil conservation legislation; the match industry; imposition of a cess on timber and forest products; and the constitution of an All-India Forest Service.

2370. **Careers in forestry.** *Misc. Publ. U.S. Dep. Agric.* No. 249 (rev.) 1951. pp. 22.

685. *Planning and Organization of Telecommunications*

See also Nos. 1800, 2232–4.

2371. **Forestry communication systems.** *Pulp Paper Mag. Can.* 52 (11), 1951 (146–153).

Discusses the potential use of very-high-frequency radio in forestry.

686. *Planning and Organization of Buildings, Transport Installations (Roads etc., including Power-line Rights-of-Way)*

See also No. 1845.

2372. LOPEZ BALAZOTE, A. El transporte de la energía eléctrica à través de los montes. **[The conveyance of electric power [cables] across forested areas.]** *Montes, Madrid* 7 (40), 1951 (279–83). [Span.]

Presents in detail, calculations made to estimate the width of forest to be clear-felled in order to allow the passage of overhead power cables and pylons. The cable in question was being erected in the province of Lérida, and the calculations were made according to the norms laid down by the 1948 order of the Ministry of Public Works.

687. *Planning and Organization of the Transport of Men, Supplies and Equipment*

See Nos. 1800, 2234–7, 2286.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 1986, 2688.

71. MARKETING OF FOREST PRODUCTS: GENERAL

See also No. 2150.

2373. RUNEBERG, L. **The activities of timber agents and timber agents' associations.** *Repr.* from *Acta for. fenn.* 58 (3), 1950. pp. 116. 4 pp. of refs. [E.fi.]

Reviews the rôle of agents and agents' associations in timber marketing in Finland, Norway, the U.K., Holland, Belgium and Denmark, with special reference to the influence of post-war conditions, particularly state intervention, on the organization of timber marketing in general and Finnish trade in particular. Concludes that the agent is still necessary, and makes recommendations on the organization of a timber agents' association in Finland.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 2324, 2624–5, 2662, 2671.

2374. **Timber statistics, including market reports, for January-March 1950 and 1951.** *Quart. Bull. Timb. Statist., FAO* 4 (1), 1951. pp. 152.

Cf. *For. Abstr.* 10 (No. 2194).

2375. REICHENSTEIN, E., DAHMS, K., and LESCHNER, F. Holzverbrauchsstudie für Westdeutschland. **[A study of wood consumption in Western Germany.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 23, 1951. pp. ix + 164. 53 refs. [G.]

A report prepared for transmission to the Timber Committee of ECE, containing statistics on: the forest area and its distribution by ownership, tree species and silvicultural systems; permissible annual yield; actual cut, production costs and labour efficiency; total imports and exports of wood; sawtimber—production, imports, exports, stocks, total consumption, consumption by types of product, prices, production costs, sawmilling efficiency; plywood, fibreboards, pulp and paper—production, imports, exports, total consumption, consumption by types of product, prices.

2376. PELLEGRINI, A. Cellulosa e carta in Italia. **[Pulp and paper in Italy.]** *Ente nazionale per la Cellulosa e per la Carta, Rome* 1951. pp. 182. [It.]

Statistics of production, consumption, exports and imports.

2377. **Wood pulp and pulpwood statistics.** *Fibre Contain.* 36 (8), 1951 (130, 132–8). P.R.

Presents, in tables and charts: (1) data on pulpwood receipts, consumption and inventories, in the U.S.A. over the period 1939–50; (2) cords of wood per ton of pulp, by regions, in 1947, and by pulp grades in 1929, 1939, and 1947; (3) value of wood per cord by species (1939 and 1947) and by years (since 1899); (4) quantities of pulpwood species used (1929, 1939, and 1947); (5) species used in different pulp grades (1947), and data on wood pulp.

2378. STOVER, W. S. **1950 pulpwood production in the South.** *For. Surv. Release Sth. For. Exp. Sta.* No. 69, 1951. pp. 26.

Gives tabulated figures showing pulpwood production by species for Alabama, Arkansas, Florida, Georgia, Louisiana, Oklahoma, Mississippi, N. and S. Carolina, Tennessee, Texas and Virginia.

2379. MARCH, E. W. **Trees, treasure and tarpon.** *Emp. For. Rev.* 30 (3), 1951 (259–62 + 6 photos).

Deals mainly with supplies and future prospects of Mahogany in the Grand Cayman. [Cf. *For. Abstr.* 9 (No. 722).]

73. PRICES

See Nos. 2363, 2500.

78. ECONOMICS OF TRANSPORT

2380. ROTHÉ, P. L. Influence de l'ouverture du port d'Abidjan sur le commerce extérieur des bois de la Côte d'Ivoire. **[Influence of the opening of the port of Abidjan on the timber export trade of the Ivory Coast.]** *Bois For. Trop.* No. 18/19, 1951 (151–6). [F.e.span.]

79. ECONOMICS OF THE WOOD INDUSTRIES

See also No. 2324.

2381. AUBRÉVILLE, A. Évolution de l'industrie forestière sur la côte occidentale de l'Afrique française depuis 1945. **[The development of the forest industry on the west coast of French Africa since 1945.]** *Rev. int. Prod. colon.* 26 (266), 1951 (195–200). [F.]

2382. **India's plywood industry.** *Timb. Tr. J.* 200 (3930), 1952 (109).

Gives brief particulars of the number of factories and their potential output, and the estimated future demand for tea-chests and commercial plywood.

8. FOREST PRODUCTS AND THEIR UTILIZATION

2383. Bericht über die Tätigkeit der Österr. Gesellschaft für Holzforschung (Ö.G.H.) im Berichtsjahr 1950. **[Report of the activities of the Österreichische Gesellschaft für Holzforschung in 1950.]** Österreichische Gesellschaft für Holzforschung, Ungargasse 12/1, Vienna III, Austria. [1951?] [G.] P.R.

Contains reports of the following committees: wood 'biology'; timber growing and felling operations; timber extraction; primary conversion; secondary conversion and processing; building construction; wood-waste utilization; timber protection and preservation; wood chemistry; resin-tapping, wood distillation and saccharification; and documentation.

2384. STAMM, A. J. L'organisation, les buts et l'orientation de la recherche sur le bois au Laboratoire des produits forestiers des États-Unis. **[The organization, objects, and direction of timber research at the U.S. Forest Products Laboratory.]** *Schweiz. Z. Forstw.* 102 (11), 1951 (545–55 + 2 photos). [F.g.]

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

See also No. 2693.

2385. KOLLMANN, F. Technologie des Holzes und der Holzwerkstoffe. I. Band. [**Technology of wood and of wood materials. Volume I.**] Springer-Verlag, Berlin. 2nd ed., 1951. pp. xix + 1050 + 6 tbls. Many refs. [G.] P.R.

The first edition appeared in 1936. This volume of the new edition deals with the anatomy, pathology, chemistry, physics, elasticity and strength of wood and wood materials.

810. *General Information on Woods*

See also Nos. 1882, 1886, 1888–90, 1926, 1985, 2404, 2671.

2386. **Bois tropicaux africains. African tropical timber.** Organisation for European Economic Co-operation, Paris. 1951. pp. 421. [F.E.] Price 9*s.* [obtainable from H.M. Stationery Office.]

This publication is an addendum to the report 'Possibilities of increasing the use of tropical timber' published in December, 1950 [cf. *For. Abstr.* 12 (No. 2964)]. Part I consists of a single alphabetical list (vernacular and botanical names) of African tropical timbers, giving vernacular English, Belgian, French, Dutch and Portuguese names for each species together with its category in the general classification adopted in the above report, i.e.: (1) slicing and/or peeling, (2) light hardwood, (3) heavy hardwood, and (4) sleepers. Part II gives for each country responsible for overseas territories in Africa (Belgium, France, Portugal, United Kingdom) information on the principal tropical timbers produced by those territories, i.e. density, colour, texture, grain, and possible uses, together with information on actual or possible exports. This is a provisional document liable to expansion and revision.

2387. **Canadian woods—their properties and uses.** Forest Products Laboratories Division, Forestry Branch, Ministry of Resources & Development, Ottawa. 2nd ed., 1951. pp. xv + 368. Many refs. Price $3·00.

Contains the following chapters: Canadian woods—general (*J. H. Jenkins*); Commercial timbers of Canada (*T. A. McElhanney*); Classified uses of Canadian woods (*J. B. Prince*); Structure of wood (*J. D. Hale*); Mechanical and physical properties of wood (*W. E. Wakefield*); Seasoning of lumber (*R. S. Millett*); Decay and stains in wood (*C. W. Fritz*); Preservative treatment of wood (*J. F. Harkom*); Chemical utilization of wood (*C. Greaves* and *H. Schwartz*); Secondary wood-using industries (*J. B. Prince*); Veneers, plywoods, and wood adhesives (*D. G. Miller*); Glues and gluing (*E. G. Bergin*); Dielectric heating (*R. W. Peterson*); Glued, laminated construction (*D. E. Kennedy*); Shipping containers (*W. Butterworth*); Timber fasteners (*J. M. Rudnicki*); Pulp, paper, and related products (*W. Boyd Campbell*).

2388. WITT, W. K., JR. **Hardwoods from Sarawak.** *Timb. Tr. J.* 199 (3921), 1951 (796–8).

A brief account of conditions, with notes on the principal timbers.

2389. ENTRICAN, A. R., revised by REID, J. S. [**The properties and uses of New Zealand timbers.**] *Inform. Ser. N.Z. For. Serv.* Nos. 3–7, 1949. Each pp. 3 (No. 3) or 4 (Nos. 4–7).

Miro (*Podocarpus ferrugineus*); Matai (*P. spicatus*); Kahikatea or White Pine (*P. dacrydioides*); Totara (*P. totara* and *P. hallii*); and Kauri (*Agathis australis*).

2390. SCHMIDT, E. Überseehölzer. [**Foreign woods.**] Fritz Haller Verlag, Berlin-Grunewald. 1951. [G.] Price *DM*16 [£1. 10*s.*]

Reproduces in loose-leaf book form with their original pagination, notes on 30 foreign woods which have appeared in *Weltholzwirtschaft* and in the *Zeitschrift für Weltforstwirtschaft* and have been noticed in this section of *Forestry Abstracts*.

2391. LAMB, G. **Foreign woods.** *Wood, Chicago* 56 (10; 12), 1951 (42, 63; 44–5). P.R.

(*a*) Muhuhu (*Brachylaena hutchinsii*), Pink Ivory (*Rhamnus zeyheri*), and Saqui-Saqui (*Bombacopsis* sp.).

(*b*) Black Ironwood (*Krugiodendron ferreum*), Banuyo (*Wallaceodendron celebicum*), East African Camphor (*Ocotea usambarensis*), Supa (*Sindora supa*), and Sepetir (*Sindora* sp.).

2392. **Specimen woods, Nos. 190–2.** *Suppls.* to *Wood* 16 (10–12), 1951 (387–8; 427–8; 467–8).

American Whitewood (*Liriodendron tulipifera*); Musine (*Croton megalocarpus*); and Crabwood (*Carapa guianensis*).

2393. [FRANCE.] [**Colonial timbers.**] *Bois For. Trop.* No. 18/19, 1951 (139–50). [F.]

Hintsy (*Afzelia bijuga*), Difou (*Morus mesozygia*), and Okoumé (*Aucomea klaineana*).

2394. COUDREAU, J. Quatre bois tropicaux d'avenir. [**Four tropical woods of the future.**] *Rev. int. Prod. colon.* 26 (263/264), 1951 (155–8). [F.]

Properties and possible uses of Sipo (*Entandrophragma utile*), Niangon (*Tarrietia utilis*), Doussie (*Afzelia bipindensis* and *A. bella*), and Azobé (*Lophira alata*).

2395. THOMAS, A. V. **Malayan timbers: Penarahan [*Myristica* spp.]** *Malay. Forester* 14 (4), 1951 (221–4).

2396. [**Properties of *Parinari excelsa* timber.**] *Rep. For. Dep. Uganda 1950*, 1951 (22–3).

Mubura (*P. excelsa*) wood was tested at Princes Risborough. It was found that seasoned wood was ca. 10% heavier than home-grown Oak, 30% superior in bending strength, stiffness, compression and shear, and 40–50% harder. Its resistance to splitting in the radial plane is about equal; in the tangential plane, 30% greater. Although equal in shock resistance, its toughness as measured by total work in bending is 20% more than that of Oak. Mubura timber has 1·36% of SiO_2 in the oven-dry weight of wood. The timber is easier to saw when green, and its hardness can be obviated by the use of carbide- or 'Stellite'-tipped saws.

811. *Structure. Identification*

See also Nos. 1895, 2604.

2397. GUINIER, P. L'étude de la structure du ' is et ses applications. **[The investigation of wood structure and its applications.]** *Rev. Bois Appl.* 6 (9/10), 1951 (17–9). [F.]

A brief account, with history of this science since 1800.

2398. KISSER, J., and STEININGER, A. Versuche zur Haltbarmachung der Phloroglucin-Salzsäure-Reaktion. **[Experiments on the fixation of the phloroglucinol/HCl reaction.]** *Mikroskopie, Wien* 5 (1/2), 1950 (39–41). 3 refs. [G.g.e.] L.S.

It has been shown that the fading of wood sections stained by the phloroglucinol/HCl reaction is primarily due to HCl being a volatile acid. Its evaporation is ordinarily prevented by the sealing of microscopic preparations. If, however, a 5/1 glycerine/H_2SO_3 mixture is used instead of the usual 2/1 glycerine/HCl mixture as mounting medium, the same staining effect is obtained, and the preparations maintain their colour for a considerable time without sealing.

2399. BERNHEIM, F., BUNN, C., and WILBUR, K. M. **The thiobarbituric acid color reaction in plant tissues.** *Amer. J. Bot.* 38 (ó), 1951 (458–9). 6 refs. O.B.D.

Presents the results of a detailed examination of the reaction of thiobarbituric acid with lignin in various portions of 15 plant species.

2400. GREGUSS, P. Xylotomischer Bestimmungsschlüssel der heute lebenden Koniferen-Gattungen. **[Anatomic key to the identification of the living conifer genera.]** *Acta Biologica, Budapest* 1 (1/4), 1950 (207–328 + 1 tbl.). 21 refs. [G.russ.]

The key to the 53 genera is based on the anatomical characteristics of 320 species examined. The work is illustrated by 212 photomicrographs and 53 sets of anatomical drawings, showing the transverse, tangential and radial sections for one species from each genus. [Cf. *For. Abstr.* 13 (No. 603).]

2401. KAEISER, M. **Microscopic anatomy of the wood of three species of Junipers.** *Transactions of the Illinois State Academy of Science, Springfield* 43, 1950 (46–50). 6 refs. L.S.

Presents in summarized and tabulated form, data that can be used as criteria for distinguishing the following species: *Juniperus virginiana, J. ashei, J. monosperma, J. virginiana* × *J. ashei* and *J. procera.*

2402. KAEISER, M. **Wood anatomy of Podocarps.** *Abstr.* in *Amer. J. Bot.* 37 (8), 1950 (663). O.B.D.

2403. JOHNSTON, D. R. **Structure drawings to 'Specimen woods'.** *Wood* 16 (10–12), 1951 (386; 426; 469).

[Cf. *For. Abstr.* 13 (No. 1490).] These instalments cover: (*a*) Opepe (*Sarcocephalus diderrichii*), Longleaf Pitch Pine (*Pinus palustris*), Pacific Myrtle (*Umbellularia californica*), and Zebrano (*Microberlinia brazzavillensis*).

(*b*) East Indian Satinwood (*Chloroxylon swietenia*), Australian Blackwood (*Acacia melanoxylon*), Queensland Maple (*Flindersia brayleyana*) and Bubinga (*Copaifera arnoldiana*).

(*c*) Thuya (*Tetraclinis australis*), African Walnut (*Lovoa klaineana*), Central American Mahogany (*Swietenia macrophylla*) and Birch (*Betula alba*).

2404. EECKHOUT, L.-E. Structuur en gebruik van de Kongolese houtsoorten. **[Structure and uses of the [principal] timbers of the Belgian Congo.]** *Bull. agric. Congo belge* 42 (3), 1951 (675–718). [Flem.f.]

Briefly describes the microscopic and macroscopic structure and possible uses of 57 species. Illustrated by 13 microphotographs.

2405. HALL, J. W. **The comparative anatomy of the Betulaceae.** *Abstr.* in *Amer. J. Bot.* 37 (8), 1950 (662). O.B.D.

Anatomical evidence indicates that the Betulaceae are not primitive, but are moderately specialized. The trends of specialization are: in the Betuleae, from *Alnus* (scalariform perforation plates with numerous narrow bars; opposite and alternate intervascular pitting) to *Betula* (reduction in the number of bars and widening of the bars in the perforation plates; exclusively alternate intervascular pitting); thence in the tribe Coryleae to *Corylus* and *Ostryopsis* (spiral thickenings in the vessels; fibre-tracheids exclusively; reduced number of wide bars in the scalariform perforation plates; heterogeneous rays) to *Carpinus* (marked tendency toward simple perforations; homogeneous rays) and to the most advanced genus, *Ostrya* (simple perforations; homogeneous rays etc.).

2406. OCCHIONI, P. Contribuição ao estudo anatômico de *Cinnamodendron sampaioanum* Occh. **[An anatomical study of *C. sampaioanum.*]** *Arquivos do Jardim Botânico do Rio de Janeiro* 9, 1949 (101–8). 5 refs. [Port.port.f.e.] L.S.

C. sampaionum differs from *C. axillare* in some anatomical features.

2407. FILHO, A. DE MATTOS. As madeiras do gênero *Johannesia.* **[Woods of the genus *Johannesia.*]** *Arquivos do Jardim Botânico do Rio de Janeiro* 9, 1949 (209–21). 10 refs. [Port.] L.S.

An anatomical study.

811.1. Anatomical Elements and Tissues

See also Nos. 1859–60, 2413, 2591.

2408. MILANEZ, F. ROMANO. Cristais de oxalato de cálcio em *Podocarpus lambertii* Klotz. **[$Ca(CO_2)_2$ crystals in *P. lambertii.*]** *Arquivos do Jardim Botânico do Rio de Janeiro* 9, 1949 (113–48). 32 refs. [Port.port.e.] L.S.

A study of the origin and distribution of $Ca(CO_2)_2$ crystals in *Podocarpus lambertii.* They are found in all primary tissues of this species, except in the wood and the secretory canals; they also appear in the phloem of the secondary structure, where they are conspicuous in the radial cell-walls and certain intercellular spaces. Microchemical studies show that the cambium and young phloem cell-walls are rich in proteins which persist (in the mature elements) in the inner (ectoplasmic) layer of the cell-wall, and in the middle lamella. The production of both the wall and the crystals is ascribed to the ectoplasm. In the material studied there exists another layer of ectoplasm external to the wall; this is probably the

source of the $Ca(CO_2)_2$ of the primary membranes and the intercellular spaces.

2409. WARDROP, A. B., and DADSWELL, H. E. **Helical thickenings and micellar orientation in the secondary wall of conifer tracheids.** *Nature, Lond.* 168 (4275), 1951 (610–2). 16 refs.

2410. MANGENOT, G., and RAISON, M. **Microscopical studies on the swelling of native, bleached and nitrated cellulose fibers.** *Bot. Rev.* 17 (8), 1951 (555–628). Numerous refs. Transl. by I. V. de Gruy and V. W. Tripp from *Revue de Cytologie et Cytophysiologie Végétales* 6 (1), 1942.

Describes studies in which a new method was used for swelling cellulosic walls, namely previous nitration of the wall and attack of the nitrocellulose so formed by a number of well known neutral solvents. The swelling agent may then be varied and instructive patterns obtained. Comparative examination of diverse materials (cotton, flax, ramie, grass fibres) reveals very important differences in wall structure. A relation seems to exist between the formation of annular or spiralled patterns in the wall of wood cells and the presence in this wall of a weave analogous to that revealed in the primary wall of fibres.

811.2. Special Features and Abnormal Structure

2411. SINNOTT, E. W. **The morphogenetic significance of reaction wood.** *Science* 114 (2967), 1951 (487–8). [Yale University.]

Abstract of a paper presented at the National Academy of Sciences' autumn meeting, 1951. The distribution of reaction wood was studied in a series of terminal shoots and lateral branches of White Pine which had been tied in various abnormal positions and held there during 1 or 2 seasons of growth. Reaction wood was found to be produced only where it would tend to restore the axis to its normal position. It seems therefore to be regulatory in character, rather than a direct response to compression or other external factors. As reaction wood is readily distinguishable, it provides a very useful means of studying experimentally the regulatory growth reactions involved in the development of tree form, and thus offers favourable material for morphogenetic research. [Cf. *For. Abstr.* 11 (No. 2813).]

2412. NYLINDER, P. Om patologiska hartskanaler. [**Pathological resin canals.**] *Medd. Skogsforskn-Inst., Stockh.* 40 (7), 1951. pp. 12. 7 refs. [Sw.sw.e.] Price *Kr.*1.

Material was examined from Spruce and Pine that had been green-pruned at different times of year, and from 5 Spruces from which a 20 × 10 cm. patch of bark had been removed in the summer. The following results were obtained: Damage to the stem may cause the formation of pathological resin canals in Spruce and to some extent in Pine. If damage occurs during the growth period, the canals form immediately; if during the dormant period, they develop in the next year's spring wood. They extend further downwards from the damage than upwards. In Spruce, they are often twice as large as the normal resin canals; in Pine they are about the same size. Their number in Spruce is often several times that of the normal canals, and falls rapidly tangentially and more slowly longitudinally from the point of damage. In Spruce, the number of normal resin canals is much lower than usual in the growth rings immediately after a ring containing pathological resin canals. The cells that are formed simultaneously with and immediately after the pathological canals, have thinner walls and are larger than those formed previously.

811.4. Growth Rings. Early and Late Wood

See Nos. 2421–2, 2424.

811.6. Texture. Grain. Figure

2413. VASILJEVIĆ, S. O obliku mehaničkih vlakana *Acer monspessulanum* L. u lignumu talasaste žice. [**The form of the fibres of *A. monspessulanum* in wood with wavy grain.**] *Glasn. šum. Fak., Beograd* No. 2, 1951 (133–40). 4 refs. [Serb.e.]

The differences between fibres in wavy-grained and normal wood are discussed and illustrated by photographs. Most of the wavy-grain fibres are irregular in thickness, twisted and curved, and many of them have undulating edges. Similar deformations in fibres of normal wood are rare, and when they occur are less well marked.

812. *Physical and Mechanical Properties*

2414. MAYER-WEGELIN, H., and WINTERFELD, K. Die Holzeigenschaften von Sumpfeiche, Roteiche und Stieleiche des Schaumburger Waldes. [**Wood properties of *Quercus robur, Q. borealis* and *Q. palustris* from the Schaumburger forest.**] *Forst u. Holz* 6 (20), 1951 (290–2). 8 refs. [G.]

A comparative study of the physical and mechanical properties of the three species.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 2525–6, 2606, 2613.

2415. STEINER, A. J. **Burning characteristics of building materials.** *Fire Engng.* 104 (4), 1951 (264–6). D.S.I.R.

Describes a method developed by the Underwriter's Laboratories, Inc., Chicago, for determining (1) the rate of spread of fire, (2) the fuel contributed to the standard flame intensity applied, and (3) the density of the smoke and the toxicity of the combustion products. It is claimed that a 10-minute exposure is sufficient to give complete information on the burning characteristics of the material. The results are given in relative units, taking 0 for incombustible material (cement asbestos), and 100 for Red Oak.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 2335, 2410.

2416. KNIGHT, R. A. G., CARRUTHERS, T. F. S., and THOMAS, A. M. **The Risborough Naiad: a continuous-operation oven for moisture content**

determinations upon veneers. *Wood* 16 (11), 1951 (416–7).

The Naiad, developed at the Forest Products Research Laboratory, Princes Risborough, consists of a frame bolted to the wall and carrying two banks of infra-red lamps between which the 6-in.-square veneer samples that have been cut from the sheets under test are carried by clips attached to a chain conveyor. The samples are weighed before they are put into the clips; after drying, they are automatically released by a trigger plate and fall into a chute from which they are collected for the final weighing. The weights and reference numbers are written on the samples themselves, to reduce paper-recording. A single determination can be made in 10 min. or 40 in 1 hr., as against several hours needed to dry a sample in an ordinary oven. The amount of radiation is controlled by varying the number of lamps, so that veneers of different thickness, species, and initial moisture content, can be dried without scorching or igniting. Tests on samples of veneer from 6 species—Afara [*Terminalia superba*], Beech, Gaboon [*Aucoumea klaineana*], Sapele [*Entandrophragma* sp.] and Binuang [*Octomeles sumatrana*]—dried in the Naiad with 3 to 9 lamps per bank, showed that for 0·064-in. veneer the Naiad moisture content with 5 or 6 lamps in use, agreed to within about 1% with that found by conventional oven-drying. Figures showing the effect of species and of thickness on error in moisture content for different numbers of lamps, and the relation between veneer thickness and the number of lamps required for Beech, are given in graphs. The Naiad has been in use at Princes Risborough since 1950, and systematic checks against conventionally dried samples have shown that its performance is consistent. It is not obtainable commercially, nor is it covered by patents; the prototype can be examined at the Laboratory on application to the Director.

2417. **Wood-water relationships.** *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (12).

The results of experiments on the restrained swelling of Spruce blocks show that when pressure is increased gradually and the wood is allowed to come to equilibrium at a constant relative humidity of 86%, there is practically no lowering of moisture content, because of relaxation of stress at this high humidity. Thus, when the clamps are gradually released again, the original dimensions are not recovered.

2418. **Diffusion of water vapour through wood [at different degrees of air pressure].** *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (12).

Experiments were made using an improved technique, by which the mouth of a 4-oz. bottle containing water was covered with a disk of wood, and the top of the bottle was sealed with a Perspex screw top. The assembly was weighed after various periods of exposure to P_2O_5. The diffusion rate for all pressures was greater through Beech than through Oak, and it increased for both species with decreasing air pressure. The diffusion rate in both radial and tangential directions was measured for Beech, Oak, Scots Pine, Spruce and Krabak [*Anisoptera* sp.]. The tangential flow through Beech and Oak was found to be appreciably greater than the radial flow; for the other 3 species the difference was less marked.

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 2211–3, 2423.

2419. PRASAD, J. **Classification of Indian timbers based on their weight per cubic foot.** *Indian For.* 77 (11), 1951 (702–5).

A review of past categories, with a note by *K. A. Chowdhury*, Wood Technologist, Dehra Dun, suggesting the use of 8 rather than 4 classes, by 7-lb. differences. Weights of 215 species are given.

2420. OEY DJOEN SENG. De soortelijke gewichten van Indonesische houtsoorten en hun betekenis voor de praktijk. **[The specific gravity of Indonesian woods and its practical significance.]** *Rapp. Bosbouwproefsta., Bogor* No. 46, 1951. pp. 183. 28 refs. [Du.jav.du.e.]

Discusses the importance of moisture content when determining specific gravity; the relationship of sp. gr. to strength properties, durability of the wood and the quality of charcoal; the variation of sp. gr. within a species, and factors affecting it; and apparatus and methods for determining sp. gr. Tabulates the sp. gr.. for one or more samples of Indonesian species, arranged under family and genus, showing whether the samples contained heartwood or sapwood, the maximum and minimum sp. gr. theoretically and empirically obtained, and the average; and durability and strength classes. Legends are in all 3 languages, and there is an index of trade and vernacular names. [Cf. *For. Abstr.* 13 (No. 1890).]

2421. BARROW, G. P. **Loss of weight of three Douglas Fir poles.** *Quart. J. For.* 45 (4), 1951 (235–6).

During the thinning of a young Douglas Fir plantation, it was noticed that poles cut near a river running along the boundary of the plantation were much heavier than those felled some distance away. In order to investigate this phenomenon, three trees, as near the same size as possible, were selected at (1) 15, (2) 47, and (3) 250 yd. respectively from the river. The trees were felled and a 6-ft. log cut from the butt end of each tree. These were numbered and weighed and left standing on end under a tree for 394 days, and weighed at frequent intervals. At the initial weighing, the over-bark weight in lb./cu. ft. of the logs was (1) 54·6, (2) 47·2, and (3) 44·3. Bark thickness was (1) 0·59, (2) 0·51, and (3) 0·52 cm. Log (1) lost more weight than the others, but at the end of the period was still much heavier (weight in lb./cu. ft. of the 3 logs was then 37·7, 32·3, and 31·5 respectively). Inspection of the annual rings showed a greater proportion of summerwood in log (1) than in log (3).

2422. CHALK, L. **Water and growth of wood of Douglas Fir.** *Quart. J. For.* 45 (4), 1951 (237–42). 5 refs. [Imperial Forestry Institute, Oxford.]

The wood of the 3 Douglas Fir trees mentioned in the preceding abstract was examined in the laboratory. Access to water from the river by the tree nearest to it, appears to explain the greater density

of the wood and wider sapwood in this tree, and also the wider and much less variable bands of summerwood in the outer rings. This finding agrees with views expressed previously that the formation of summerwood in Douglas Fir in this country is related to the amount of moisture available during the period of summerwood formation.

812.7. Strength Properties

See also Nos. 1890, 2488, 2514–5, 2552.

2423. SUZUKI, Y. **Distribution of several strength values and specific gravity in Bamboo culms (*Phyllostachys pubescens* Magel et H. de Lehaie).** *J. Jap. For. Soc.* 30 (1/2), 1948 (12–3). [Jap.e.]

Results of experiments, given in tables and a graph, show mechanical strengths and sp. gr. to be higher at the outer than at the inner and at the upper than at the lower parts of the culm. The nodes have high sp. gr. and shear strength, and low bending strength, compared with the internodes. [Cf. *For. Abstr.* 13 (Nos. 622–3).]

2424. BETHEL, J. S. **The influence of wood structure on the strength of Loblolly Pine wood (*Pinus taeda* L.).** *Tech. Rep. Sch. For. N.C. St. Coll.* No. 3, 1950. pp. 6. 14 refs. P.R.

A statistical analysis carried out to determine whether, in *P. taeda*, the % of summerwood is related to the strength of the wood, which is independent of specific gravity. It was found that the optimum % of summerwood is 47·57 if high strength in compression parallel to grain is desired.

2425. KINGSTON, R. S. T., and ARMSTRONG, L. D. **Creep in initially green wooden beams.** *Aust. J. appl. Sci.* 2 (2), 1951 (306–25 + 1 photo). 10 refs. P.R.

Beams of initially green *Eucalyptus regnans* were loaded to various fractions and multiples of the design stress. The loads were maintained for long periods to study the increase in deflection with time, and the incidence of failure under these conditions. Measurements were made of recovery after unloading. Beams were also tested under periodic loading. It was demonstrated that the deflection of beams under load increases, but, in general, at a diminishing rate, for at least 1 year; if, however, failure begins during this period, deflection continues at an increasing rate. For stress between 12 and 200% of the design stress for select-grade material, the average increase in 1 year was 3- to 4-fold, in some cases reaching 6-fold or over. A number of beams loaded to 200% of design stress failed in periods varying from 1 week to over 9 months. All beams loaded to 300% of design stress failed within a few months. The effect of shear stresses, recovery after unloading, and the effect of periodic loading, are also discussed. *From authors' summary.*

2426. JOHNSON, J. W. **Relationship between shear and diagonal web stresses in laterally loaded wood panels.** *Abstr. of thesis*, in *J. For.* 49 (9), 1951 (638).

2427. ARMSTRONG, F. H. **Abrasion tests on some recently introduced hardwoods. 8–9. [Resistance to wear as flooring.]** *Wood* 16 (10; 11), 1951 (380–1; 418–9).

(8) Wear-resistance of Wallaba (*Eperua falcata*) is very high. Its surface is comparatively permanent, and its abrasion loss is low. It should be very suitable for decorative, general utility and industrial floors. Pre-boring for nails is desirable when it is used in wood-strip form.

(9) Rift-sawn Kokrodua (*Afrormosia elata*) shows moderate resistance to wear, but that of flat-sawn material is comparatively low. This timber appears to be best suited for light to moderately heavy duty in domestic and other buildings, and for decking as a substitute for Teak. It is not suitable for heavy-duty flooring.

813. *Wood Chemistry*

See also Nos. 2587 *et seq.*

2428. **Préparation des bois pour les analyses chimiques. Études faites au titre de la Conférence technique periodique de la cellulose. - [Preparation of wood for chemical analyses. Study made for the periodic Cellulose Conference.]** *Mémorial des Services Chimiques de l'État, Paris* 35 (2), 1951 (7–11). [F.f.] L.S.

When extracted with alcohol/benzene, chips yield a higher % of extract than sawdust, at least in the case of Oak and Poplar. The form of the wood (i.e. chips or sawdust) has no effect on the results of lignin determination. It seems that, for the determination of cellulose, the 20- to 60-mesh fraction (equivalent to ca. 50- to 150-mesh British Standard) of sawdust should be used, as chips are not so well penetrated by reagents.

2429. SAVARD, J. Le problème du classement des bois tropicaux en vue de leurs applications. **[The problem of classifying tropical woods with a view to their utilization.]** *Bulletin, Association Technique de l'Industrie Papetière, Paris* 5 (5), 1951 (27–81). 8 refs. [F.f.] (*Suppl.* to *Papeterie, Paris* June, 1951.) L.S.

The Laboratoire du Centre Forestier Tropical has determined for several hundreds of tropical species the following properties: extraction % (alcohol/benzene 1/1, boiling water, and 1% [caustic?] soda solution) of lignin, cellulose, ash, and SiO_2, and the furfural index of wood and of cellulose. So far no relations are apparent between the analytical data and the properties of the woods. In addition to a further study of the results obtained, the author suggests adoption of the following analytical tests for classifying the woods according to their hydrolytic behaviour: the toxicity, the value of K_1 (the constant of the rate of formation of a sugar from the corresponding -osan), and the value of the corrected cellulose (potential sugars). *From author's summary.*

2430. LEWIS, H. F. **The significant chemical components of Western Hemlock, Douglas Fir, Western Red Cedar, Loblolly Pine, and Black Spruce.** *Tappi* 33 (6), 1950 (299–301). 2 refs. P.R.

A study has been made of the chemical components of selected samples of Douglas Fir, Western Hemlock, Western Red Cedar, Black Spruce and Loblolly Pine. Douglas Fir and Loblolly Pine are characterized by higher α-cellulose and lower hemicellulose-B contents than are the other 3 woods.

The 3 Western woods are lower in pentosan than the Spruce and Pine. An unusually high % of the uronic-acid content of the Douglas Fir remains in the α-cellulose isolated from that wood. Western Red Cedar is characterized by the high lignin content of the extractive-free wood and by the high extractive content of the wood. *From author's summary.*

2431. KURTH, E. F. **The chemical analysis of Western woods. Part III.** *Tappi* 33 (10), 1950 (507–8). 2 refs. P.R.

[Cf. *For. Abstr.* 11 (No. 3156).] Four species of western hardwoods (*Acer macrophyllum, Alnus rubra, Lithocarpus densiflorus*, and *Castanopsis chrysophylla*) and 4 species of western softwoods (*Pinus contorta* var. *latifolia, Chamaecyparis nootkatensis, Abies grandis* and *Abies procera*) have been analysed for ether, alcohol and water extractives, holocellulose, lignin, methoxyl group, acetyl group, and ash content.

2432. CARVALHO, J. DA SILVA. Estudo químico-analítico da rama de *Criptomeria japonica* Don. [**A chemical analysis of branch wood of *Cryptomeria japonica.***] *Publ. Serv. flor. aqüic. Portugal* 14 (1/2), 1947 (69–74). 7 refs. [Port.e.]

Analysis of wood and bark gave: lignin content 36·9%, pentosan content 14·2% and Cross-and-Bevan cellulose content 49%. The tannins of the bark are of a catecholic nature, and form 5·1% of the dry weight of the bark.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also No. 2410.

2433. BLAND, D. E. **Sub-project C.6–2. Chemical reactions, molecular weight and constitution of Eucalypt lignin. Progress report No. 12. Chromatographic resolution of methanol lignin and of methanol extracts of *E. regnans* wood.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1951. pp. 6 + 1 dgm., 1 gph. 4 refs. P.R.

Methanol extracts of *E. regnans* wood and of precipitated lignin prepared therefrom, have been resolved on paper chromatograms. These showed that the precipitated lignins were contaminated with other materials of high R_F [resolving factor] values (benzene : water). When the methanol extract was similarly resolved, only the spot at $R_F = 0$ had an ultra-violet absorption curve typical of lignin. It is suggested that native lignin would be isolated by a method involving a chromatographic purification. *Author's summary.*

2434. FREUDENBERG, K., DIETRICH, H., and SIEBERT, W. Ultrarotspektren ligninverwandter Stoffe. [**Infra-red spectra of substances related to lignin.**] *Chem. Ber.* 84 (10), 1951 (961–71). 4 refs. [G.] P.R.

A comparison of the infra-red spectra of 13 substances related to softwood and hardwood lignin.

2435. BREGER, I. A. **Chemical and structural relationship of lignin to humic substances.** *Fuel* 30 (9), 1951 (204–8). 12 refs. D.S.I.R.

Using a simple structure of lignin as a model, suggestions are advanced for the changes which may occur in the lignin molecule to convert it into a series of related compounds collectively known as humus. Structural similarities between lignin and humic acid are indicated by the infra-red absorption spectra of these substances. *From author's foreword.*

2436. BREGER, I. A., and WHITEHEAD, W. L. **Thermographic study of the role of lignin in coal genesis.** *Fuel* 30 (11), 1951 (247–53). 12 refs. [Department of Geology, Massachusetts Institute of Technology, Cambridge, Mass.] D.S.I.R.

Results of research conducted with the special vacuum differential thermal-analytical apparatus show a sharp exothermic peak for lignin at ca. 425° C. and a similar peak at ca. 400° C. for cellulose. The lignin peak can be traced faintly in peat, and appears again strongly in lignite. The lignin curve is visible in bituminous coals. The peaks become less pronounced and occur at higher temperatures as one passes to semi-anthracite, and disappear completely in anthracite. *From authors' summary.*

2437. GRALÉN, N., and BERG, S. **Treatment of wood with ultrasonic waves.** *Journal of Polymer Science, Easton, Pa.* 6 (4), 1951 (503–7). 12 refs. [E.f.g.] D.S.I.R.

Presents the results of a 1942–43 investigation on acetone-extracted Spruce wood powder treated with ultrasonic waves. It has been found that these cause a destruction of the biological structure of wood and split the bonds between lignin and cellulose or other carbohydrates. After treatment with ultrasonics, ca. 50% of the wood can be dissolved in $CuO–NH_3$ solution. The dissolved carbohydrate material consists of two main components with two different sedimentation rates. These components have been tentatively referred to as cellulose and hemicellulose.

2438. ÅLGAR, W. H., and GIERTZ, H. W. **Fiber structure and pulp properties. II. The influence of ultrasonic treatment on wood cellulose fibers.** *Svensk PappTidn.* 54 (20), 1951 (693–700). 8 refs. [E.sw.g.] P.R.

[Cf. *For. Abstr.* 13 (No. 776).] Ultrasonic treatments were applied to 3 holocellulose preparations, 3 semichemical acid sulphite pulps, 1 paper- and 3 rayon-type sulphite pulps, an overcooked sulphite and a sulphate pulp, all prepared from the same sample of *Picea abies*. Results are illustrated by 22 photomicrographs. Fibres generally, especially those with a high hemicellulose content, swelled to more than their water-swollen condition as a result of ultrasonic treatment. In some cases "balloon" formation occurred as in swelling by chemical agents. Fibres of the rayon and overcooked pulps swelled considerably in spite of their low hemicellulose content, because the primary wall, which generally acts as a restraint on swelling, had been largely destroyed by strong chemical action. The sulphate fibres swelled comparatively little in spite of a fairly high hemicellulose content, probably because bonds restraining swelling had been formed during chemical treatment.

2439. DOERING, H. Über Theorie und Praxis der Alphacellulosebestimmungen. [Theory and practice of α-cellulose determinations.] *Papier, Darmstadt* 5 (7/8), 1951 (127–30). 2 refs. [G.] L.S.

2440. **Holocellulose in wood. Revision of Tappi official standard T 9 m-45.** *Tappi* 33 (9), 1950 (100*A*–101*A*). 2 refs. P.R.

2441. **Pentosans in wood. Tappi tentative standard T 19 m-50.** *Tappi* 33 (7), 1950 (89*A*–90*A*). 1 ref. P.R.

2442. JORGENSEN, L. **Behaviour of cellulose and wood polyoses ('hemicellulose') during stepwise hydrolysis and extraction of Birch and Spruce holocelluloses.** *Pulp Paper Mag. Can.* 52 (11), 1951 (94–5).

Condensation of a paper presented at the symposium on fundamental chemistry of cellulose and lignin, Montreal, September 1951.

2443. FOSTER, D. H., and WARDROP, A. B. **The crystalline structure of cellulose as revealed by acid hydrolysis.** *Aust. J. sci. Res.* 4A (3), 1951 (412–22). 16 refs. P.R.

The hydrolysis of holocellulose from *Eucalyptus regnans* has been studied, employing a percolation technique and using 2% H_2SO_4 for varying times of hydrolysis (0–6 hr.) and at 3 temperatures, 150, 160, and 170° C. For comparison a series of experiments at 160° C. on cotton was also carried out. The course of hydrolysis of the resistant cellulose in each experiment could be represented by the equation for a 1st-order reaction. The 'reaction constant' for cotton was smaller than that for holocellulose. Powder X-ray diffraction photographs were made of samples at each stage of hydrolysis in the 160° C. series. From these photographs the breadth at ½ maximum intensity of the line corresponding to the (002) planes, and the combined lines corresponding to the (101) and ($10\bar{1}$) planes were determined by photometric measurement. Throughout the period of hydrolysis studied, the line breadths decreased for both holocellulose and for cotton. This observation is considered to indicate the existence of a distribution of the degree of lateral order of the crystalline regions in each sample. The narrow line breadths in the cotton series may indicate the existence of greater lateral order in the cotton than in the wood holocellulose and may account for the observed smaller reaction constant for cotton. The results obtained are consistent with the view that the mesomorphous regions surrounding the micelles are more extensive in wood cellulose than in cotton. *Authors' summary.*

2444. HEUSER, E., and JÖRGENSEN, L. **Chain length and chain-length distribution of wood cellulose as compared with cotton.** *Tappi* 34 (2), 1951 (57–67). 34 refs. P.R.

A review of the various methods of determination and results obtained so far. Three methods were used by the authors with Spruce and Aspen wood and cotton. The diverging values of the degree of cellulose polymerization obtained for Spruce by two of the methods, are discussed.

2445. COHEN, W. E. **Chain length distribution studies on nitrated wood and cotton cellulose.** *Pulp Paper Mag. Can.* 52 (11), 1951 (94).

Condensation of a paper presented at the Symposium on fundamental chemistry of cellulose and lignin, Montreal, September 1951.

2446. GUSTAFSSON, C., SUNDMAN, J., PETTERSSON, S., and LINDH, T. **The carbohydrates in some species of wood.** *Pap. ja Puu* 33*B* (10), 1951 (300–1). 4 refs. [E.e.] P.R.

Samples of wood of 20 different species, and of the spring- and summer-wood separately for *Pinus sylvestris* and *Picea abies*, were hydrolysed, and the monosaccharides in the hydrolysates analysed by paper chromatography. The contents of galactan, glucosan, mannan, araban, and xylan were calculated and results are tabulated.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 2408, 2567.

2447. CAMPBELL, W. G., FRAHN, J. L., HIRST, E. L., PACKMAN, D. F., and PERCIVAL, E. G. V. **Wood starches. Part I.** *Prepr.* from *J. chem. Soc.* Dec., 1951 (3489–98). [Forest Products Research Laboratory, Princes Risborough.]

The occurrence of starch in wood is discussed, together with methods of isolating and purifying sapwood starches. The granular starch from Elm sapwood has been shown to contain 20·5% of amylose. The methylated starch was hydrolysed and the products separated chromatographically, both on paper strips and on a cellulose column. The yield of tetramethyl glucopyranose (4·3%) indicates that in the amylopectin component there are 20 glucose residues per terminal group. This conclusion is supported by the results of oxidation with periodate. *Authors' summary.*

2448. BRANDT, C. W. **Note on resins of the genus *Dacrydium*. The wood resin from *Dacrydium bidwillii*.** *N.Z. J. Sci. Technol.* 33*B* (2), 1951 (141). 2 refs. P.R.

The resin extracted with acetone was found to consist mainly of the diterpene alcohol, manoöl.

2449. VIALLE, J. Les constituants des cires extractibles du bois par les solvants organiques. [Constituents of waxes extractible from wood by means of organic solvents.] *Bulletin, Association Technique de l'Industrie Papetière, Paris* 5 (5), 1951 (281–6). 13 refs. [F.f.] (*Suppl.* to *Papeterie, Paris* June, 1951.) L.S.

A definition of wood waxes is given, based on the course of extraction and fractionation of the ether extract. The constituents of waxes are studied, particularly the phenolic compounds which the author classifies under two heads: (1) those with a skeleton derived from a single phenylpropene group, and (2) those with a skeleton derived from two such groups. *From author's summary.*

2450. **Investigation of a crystalline substance found in Peroba de Campos wood (*Paratecoma peroba*).** *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (37–8).

A white crystalline substance present in all samples of the wood examined was isolated and found to be identical with lapachonone. The constitution of the substance is at present unknown.

813.3. Ash Constituents

2451. KINGSBURY, R. M. **Determination of iron in wood and wood pulp.** *Tappi* 34 (8), 1951 (382–4). 10 refs. P.R.

Describes a rapid method consisting in (1) wet-digesting the material, (2) reducing Fe to ferrous form, and (3) determining Fe spectrophotometrically in the form of the *o*-phenanthroline complex. It is claimed that the sensitivity and reproducibility of the method are in the range of 1 p.p.m. *From author's summary.*

2452. GRAN, G. **Determination of tungsten in wood and wood pulp.** *Svensk PappTidn.* 54 (22), 1951 (764–8). 9 refs. [E.sw.g.] [Svenska Träforskningsinstitut, Trätekniska Avdeling.] P.R.

Describes a method of determining tungsten in wood and wood pulp impregnated with photo-tungstic acid. The samples were decomposed with perchloric and nitric acids, and the tungsten in the solution thus obtained was determined colorimetrically.

813.5. Reaction with Metals

See Nos. 2575, 2616.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack

See No. 2516.

814. *Natural Durability. Old Wood. Fossilized Wood*

See Nos. 1888–90, 1963, 2533, 2559.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 2411–2, 2421–2.

2453. BOYD, J. D. **Tree growth stresses. II. The development of shakes and other visual failures in timber.** *Extr.* from *Australian Journal of Applied Science, Melbourne* 1 (3), 1950 (296–312 + 5 photos). 6 refs.

[Cf. *For. Abstr.* 12 (Nos. 2677–8).] The development of heart shakes is related to the growth stresses in trees and the disturbances caused by felling and cross-cutting. In standing trees the development of critical ring tension in the region towards the pith of the tree is considered the most important factor. In fallen trees and diametral planks (cut along a full diameter) the conversion of longitudinal strain energy into transverse stresses is the ultimate cause of failure. However, the presence of primary ring stresses, and a comparative weakness of the timber in the region of the pith are significant contributing factors. In pored timbers of small diameter, the relative severity of development of heart shakes is attributed to their steep longitudinal strain gradient across a transverse section. It is suggested that macroscopic compression failures in trees result from a combination of growth stresses and severe wind stresses. Possible methods of minimizing the effect of growth stresses on the utilization of timber are discussed. *Author's summary.*

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

See also Nos. 2693–4.

2454. CHEVAIS, D. Le Collège national technique du Bois de Mouchard. **[The national college of wood technology at Mouchard.]** *Bois For. Trop.* No. 18/19, 1951 (107–9). [F.]

2455. **At the Building Exhibition.** *Timb. Tr. J.* 199 (3923), 1951 (1148–52).

Describes, with illustrations, some woodworking machinery from the exhibition at Olympia, November 1951, including sanding machines, saw sharpeners, a long bandmill, saws of different types, spindle moulders and planers.

821. *Barking*

See also Nos. 2188–90.

2456. BELL, G. E., and MARTIN, P. E. **Bark removal methods and machines.** *Mimeo. For. Prod. Lab., Can.* No. *O*–162, 1951. pp. 5 + 4 tbls. + 20 photos. (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1205 *B*–7–*d*).

All barking machines at present in use can be classified into 4 main groups employing, respectively (1) cutting knives, (2) rubbing friction, (3) hydraulic pressure, and (4) thermo-pressure. Information on the various barkers [8 of type (1), 8 of type (2), and 6 of type (3)] is tabulated and accompanied by photographs intended to illustrate the general construction of the various machines.

Bark removal by thermo-pressure, type (4), is still in the experimental stage. The material to be barked is inserted into a stainless steel cylinder, and steam pressure is applied and suddenly released. The bark is reported to be literally 'exploded' from the wood. The method is being developed by the Carthage Machine Co., Carthage, N.Y.

2457. **Hydraulic barking equipment reviewed.** *Timberman* 53 (1), 1951 (62–6).

Summarizes discussion at the Sawmill Operating Conference, held at Portland, Ore., in September 1951.

2458. [WOLLENBERG, R. P.] **[Slab barkers.]** *Timberman* 53 (1), 1951 (66–8).

Describes barkers, consisting of a conveyor, a hod-down device and a nozzle to apply water, for slabs to be chipped for pulping.

2459. WALTERS, C. S., and FOX, H. W. **Hand-peeling fence posts compared to mechanical peeling.** *Sth. Lumberm.* 183 (2292), 1951 (46–54). 7 refs. [University of Illinois Agricultural Experiment Station, Urbana, Ill.]

A total of 530 Eastern White Pine poles were barked, 271 poles by hand and the rest on the newly designed 'Illini' post peeler, a revolving-head abrasion barker of simple design, made locally. The machine has two revolving heads, one with 8 lengths of chain strung taut in a criss-cross diagonal pattern, and the other, above the first, consisting of

11 wire-wheel brushes keyed to a shaft supported in an adjustable frame. The machine is described in detail, with illustrations. Barking tests were made at roughly monthly intervals between June 1949 and June 1950. The average rate of machine barking for the whole period was 2·2 times that of hand barking, ranging from 1·1 to 3·2 for individual lots. The total of posts barked per 8-hr. day ranged for machine barking from 67 to 400, average 123, and for hand barking from 35 to 150, average 55. Machine barking of frozen posts was practically impossible, hand barking was possible but uncomfortable out-of-doors. Posts left for a few hours in direct sunlight were harder to bark than freshly cut ones; posts left for a week were twice as hard to bark as freshly cut ones. Hardwood posts were successfully barked but were more difficult than those of White Pine. Heavy chain on the revolving head gave better results than ⅜-in. wire rope. Taut chains were better than loosely strung ones, which damaged the sapwood and wore less well. Wire-wheel brushes were unsatisfactory by themselves but useful when used with the chain head for removing inner bark and bark round knots and branch stubs. The total cost of the test model was $325.

822. *Saws and Sawing*

See also Nos. 1800, 2191–4, 2489, 2694.

2460. Slutgiltiga förslag till standard för cirkelsågblad. **[Final proposal for standardizing circular saw blades.]** *Pap. ja Puu* 33*B* (9), 1951 (289–94). [Fi.Sw.] (*Finlands Standardiseringskommissions Meddelanden* No. 69/1/51.) P.R.

A modification of a previous proposal. [Cf. *For. Abstr.* 12 (No. 1307).]

2461. [HARRIS, P.] **New saw experiments in U.K.** *Timber of Canada* 12 (2), 1951 (43–5).

An account of experiments on circular rip-saws at Princes Risborough.

2462. **[Research in ripsawing.]** *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (26 + 2 photos).

A special technique has been evolved for recording by high-speed photography the distribution and movement of sawdust in and around the gullets of saws while they are cutting. Photographs are given showing the distribution of sawdust in the gullets of a 26-in.-diameter circular saw, with 54 teeth, 20° hook and a rim speed of 10,000 ft./min., cutting English Oak at 12% moisture content.

2463. KNEŽEVIĆ, M. O čistoći reza. **[Clean saw-cut.]** *Šum. List* 75 (1/2), 1951 (31–42). 2 refs. [Croat.e.]

Discusses the effect of the following factors on the smoothness of cut: the blade and its movement, kind of blade and operation of the machine; also describes and illustrates a pantographic recording instrument designed by Marhet, for testing the smoothness of the cut. It is suggested that special blades (with teeth adapted to individual species) could produce lumber the planing of which would be superfluous.

2464. THUNELL, B., and FORSBERG, P. Försågningsmetodens inverkan på måttnoggrannheten hos sågade trävaror. **[The effect of sawing methods on the accuracy of dimensions of sawn goods.]** *Medd. svenska TräforsknInst.* (*Trätekn. Avd.*) No. 26*B*, 1951. pp. 9 + [2] + 4 dgms., 10 gphs., 13 tbls. 4 refs. [Sw.] P.R.

Measurements of the accuracy of dimensions of planks, boards and battens of different sizes, were made at 3 circular-saw and 2 frame-saw mills. Results are given in graphs and tables. The frame-sawn stock showed greater accuracy than the circular-sawn, especially in thickness. Accuracy of stock from the Ari re-saw and the Ake edger lay between that from the circular and frame saws. With the circular saw, deviation from the required measurements appeared to increase with the size of the stock.

2465. THUNELL, B., and FORSBERG, P. Undersökningar över sågning med stukade och skränkta ramsågblad. **[Researches on sawing with swage-set and spring-set frame-saw blades.]** *Medd. svenska TräforsknInst.* (*Trätekn. Avd.*) No. 23*B*, 1951. pp. 14 + [16] + 15 dgms. and gphs. [Sw.sw.] P.R.

The results of tests using swage- and spring-set blades are given in graphs and tables. The following conclusions are drawn: (1) There is no difference in power consumption between the two types. (2) The swage-set blade heats less. (3) The kerf of a swage-set blade will show a narrowing of 0·1 mm. with two regrindings, in the course of sawing 1,000 pieces in 6½ hours. (4) A swage-set blade gives about 9·5% more sawdust than a spring-set blade with the same kerf. (5) There is no difference in output between spring-set and chromium-plated swage-set blades. Unplated swage-set blades have a rather smaller output. (6) There was a considerable variation in dimensions, both in breadth and thickness. The mean deviation from the mean value was about 0·7 mm. for both blades. (7) No difference was found between the depth of profile from the two blades. (8) Sawing butt-end foremost is less satisfactory with a swage-set blade.

2466. THUNELL, B., and HILTSCHER, R. Die Beanspruchung von Gattersägeblättern im Betrieb. **[Stresses in frame-saw blades during operation.]** *Holz Roh- u. Werkstoff* 9 (6), 1951 (232–42). 2 refs. [G.g.] P.R.

Both photo-elastic tests and breakage statistics show that the danger section lies at the bottom of the gullet. The maximum stress found in this region is caused essentially by the blade tension and the wedge action in the gullet. The latter can be reduced by increasing the gullet radius. The use of an elliptical gullet is advocated.

2467. **Band saw tooth shape, spacing and speed.** *Timberman* 53 (1), 1951 (82–4).

Summarizes discussion at the Sawmill Operating Conference, held at Portland, Ore., in September 1951.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

See also Nos. 2693–4.

2468. HORDERN, R. H. **The practical application of cutting angles.** *Wood* 16 (9), 1951 (356–8).

Discusses the different methods of treatment for woods with figured grain, for mild soft timbers which saw and plane easily and for Lignum Vitae, the limitations on change in cutter angle imposed by the shape of the cutter head, and the special problems in manufacturing mouldings and stock of curved or irregular section.

2469. Hyler, J. E. **Special router work.** *Sth. Lumberm.* 183 (2295), 1951 (62–4).

Discusses the equipment needed where routers are used for special purposes, e.g. production of twist-turned articles, patching, and cutting grooves in plywood edges to prepare them for reception of metal edge strip.

824. *Forms of Joint. Jointing and Assembly*

See also No. 2514.

2470. Tompkins, J. **Utilizing short lengths.** *Wood, Chicago* 56 (11), 1951 (43, 69). P.R.

Describes a new kind of glue joint, the 'finger joint' used in the manufacture of doors, which is cut by means of a special cutter-head, and makes it possible to use short lengths of wood.

2471. **Woodworkers' Tool Works designs pyramid joint.** *Wood-Worker, Indianap.* 70 (7), 1951 (70). P.R.

An illustrated description of a new joint developed by the Woodworkers' Tool Works, Chicago. This (Knourek system) joint makes it possible to build up short pieces into strong, durable boards which can be used in furniture. The sectional view of the joint is that of a sloping crenellated wall. A machine for cutting pyramid joints is being designed.

824.8. Glues and Gluing

See also Nos. 2387, 2470–1, 2626.

2472. Recherches diverses sur les colles et collage. A. Étude sur les conditions d'emploi de la colle caurite. B. Controls de l'état de la colle caurite au moment de l'emploi. [**Researches on glues and gluing. A. Conditions for the use of Kaurit glue. B. Control of the state of Kaurit glue at the time of use.**] *Rapp. Fonds for. nat. Jan./Dec. 1950, Annexe XI* 1951 (9–14). [F.] [Institut national du Bois, Paris.]

In the first of these studies it was found that measurement of viscosity was the most satisfactory method of determining the degree of ageing of Kaurit [urea-formaldehyde] glue. A simple method of measuring viscosity is described. In the second study, measurement of viscosity was used in gluing tests with glue stored for different periods in different conditions. It was found that rate of increase in viscosity was an even better criterion for comparison of different lots of glue than simple measurement of viscosity.

2473. Plath, E. Heissverleimungen mit Kaurit. [**Hot gluing with 'Kaurit' glue.**] *Holztechnik* 31 (10), 1951 (282–4). [G.g.] P.R.

Presents the results of an investigation carried out in the Prüfstelle für Sperrholz in Karlsruhe, on the formation of dry-strength and wet-strength Kaurit-glue joints with the use of various hardeners.

2474. MacLagan, C. F. **Adhesive complaint diagnosis.** *Wood, Chicago* 56 (12), 1951 (33–4, 36). P.R.

Enumerates, and discusses some of, 12 major faults in gluing plywood.

2475. Scales, G. M. **Shortening the setting time of glue joints.** *Timber & Plyw.* 101 (2624), 1951 (716–20). P.R.

Account of various heating methods. From a paper presented at the Aero Research Summer School at Cambridge, September 1951.

2476. **Gluing of furniture parts by means of high frequency currents.** *Technical Division Reports, Office of Technical Services, United States Department of Commerce, Washington, D.C.* No. *IR* 5884 [*n.d.*] pp. 3. P.R.

Gives distance of electrodes from the joints; setting time, and effect of humidity of the wood on setting time.

2477. Lacey, P. M. C., Howe, H. A., and Soane, G. E. **Radio frequency and other heating processes. Progress report 8. Stray field heating.** Forest Products Research Laboratory, Princes Risborough. 1951. pp. 11 + 6 dgms. P.R.

Six groups of basic electrode arrangement for applying stray-field R.F. heating to the setting of glue joints, have been investigated. Set areas produced in 20 sec. at various voltages have been examined. Relative advantages of the different patterns have been demonstrated, and the optimum electrode spacings determined.

2478. Lacey, P. M. C., and Soane, G. E. **Radio frequency and other heating processes. Progress report 9. A calorimetric method of assessment of the R.F. conductivity of glues.** Forest Products Research Laboratory, Princes Risborough. 1951. pp. 8. P.R.

The radio-frequency conductivity of a number of synthetic resin glues has been determined over a wide range of temperature, to an accuracy of about ± 15%, by a calorimetric method, and compared with the voltages needed to set the same glues in wood joints. It is concluded that conductivity is not a reliable guide to setting voltage. *Authors' summary.*

2479. **Radio frequency edge gluing.** *Timb. Tr. J.* 199 (3919), 1951 (451–2).

The G.E.C.-Fielding edge-gluing machine has been developed jointly by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2. and by Fielding and Platt, Ltd., Atlas Works, Gloucester, for the production of timber panels and blockboards 36 to 80 in. in length, up to 40 in. in width, and from ⅜ in. to 2 in. thick, from scantlings or offcuts. Single boards can be made up from strips of various widths, provided that the thicknesses are uniform. Boards 80 × 40 × 1 in. have been made from strips 2 in. wide in 5 min. Production rate varies with the moisture content of the wood and the type of glue. The edge-gluing machine consists of a pneumatically operated press, supplied with power through a matching unit from a 5 kw R.F. generator. A simple glue-spreader and an electrically-driven air compressor and reservoir

are included in the plant. Two operators are needed. One feeds strips into the glue-spreader and stacks the completed panels as they are ejected from the press; the other takes the glued strips from the spreader and assembles them on the feed table.

2480. KEYLWERTH, R. Infrarotstrahler in der Holzindustrie. [**Infra-red radiators in the wood industry.**] *Holz Roh- u. Werkstoff* 9 (6), 1951 (224–31). 33 refs. [G.g.] P.R.

Discusses the applicability of infra-red radiation for the drying of lacquer, seasoning of converted timber, and veneer drying, and describes the principles and design of infra-red radiators, both electric and gas-heated.

825. *Cleaving. Adzing. Mechanical Comminution*

See No. 1800.

827. *Bending. Moulding (other than by Cutting)*

See Nos. 2504–5.

829.1. *Finishing*

See also No. 2480.

2481. SANDERMANN, W. Neuzeitliche Oberflächenbehandlung von Holz. [**The modern surface treatment of wood.**] *Holz Roh- u. Werkstoff* 9 (9), 1951 (337–41). 39 refs. [G.g.] P.R.

A general account.

2482. **Pre-bleached veneers.** *Wood, Chicago* 56 (9), 1951 (27).

Describes a process developed by B. H. Creal, and about to be used on an industrial scale, which neutralizes the colouring matter in the wood of face veneers without affecting the wood structure. The veneers ($\frac{1}{24}$ in. is the optimum thickness to be 'pre-bleached') need then only have a coating of water-white lacquer to give a white surface, while any desired colour may be obtained by staining or tinting. It is further claimed that all stains, spots, and mineral streaks in the veneer are removed by the process.

2483. ARMSTRONG, W. N. B., LYONS, R. H., ROULSTON, L. C., and TURNER, J. R. **Staining of Canadian hardwoods.** *Repr.* from *Chemistry in Canada, Ottawa* Feb., 1951. pp. 2. P.R.

Describes a method developed for staining Hard Maple to resemble a finished Walnut (for wooden parts of service rifles), a uniform dark colour of the surface being obtained despite grain variations. The wood is stained in a solvent stain, then air-dried, evacuated, oil-stained, and cured in air.

2484. DOUGLAS, W. **Drum sanding is efficient.** *Woodwkg. Ind.* 8 (12), 1951 (811–3, 832). P.R.

The theory and practice of drum sanding.

2485. **Sandblasting for the woodworking industry.** *Woodwkg. Ind.* 8 (11), 1951 (723–4). P.R.

A short account of new methods in the U.K. and Germany.

2486. BRYANT, B. S. **Knot plugging to up-grade lumber.** *Circ. Inst. For. Prod., Wash.* No. 16, 1951. pp. 4. 6 refs.

Discusses the advantages of patching and plugging knots, and describes equipment and techniques.

2487. ROY, S. K., and KAR, B. C. **Metallization and electroplating of wood, glass and plastics.** *J. sci. industr. Res., India* 10*A* (6), 1951 (252–3). 4 refs. D.S.I.R.

A brief survey of modern methods. Wood is generally graphitized: wooden articles are polished and varnished several times with turpentine oil and powdered graphite applied uniformly over the surface with a camel-hair brush. The conducting coating is then electroplated with Cu, on which Ni, Ag, Cr, etc. may be deposited by using standard plating baths.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 2459, 2517, 2532, 2537, 2543–8.

2488. VENET, J. Étude de la resistance mécanique des bois de mine. [**A study of the mechanical properties of mine timbers.**] *Ann. Éc. Eaux For. Nancy* 12 (2), 1951 (323–408). [F.f.g.e.]

Report on extensive tests carried out by the École national des Eaux et Forêts in co-operation with 'Les Charbonnages de France', in order to determine the mechanical properties of the principal indigenous and exotic trees species grown in France and used as mine timber [cf. *For. Abstr* 10 (No. 573)]. Static bending was tested on spans of 1 m. with loads up to 10 tons, and compression parallel to the grain on lengths of 1·6 m. with loads up to 30 tons. The following factors were investigated: origin, felling season, period of storage, defects (knots, seasoning cracks, initial deflection, S-bends etc.), and structural characteristics such as sapwood %, width of annual ring, grain etc. Notes were made of deformations occurring within the elastic limit, those within the safe limit, and finally those deformations affecting the fibres after rupture. Data for each species are given in graphs and tables, and there are keys for identification, and descriptive notes of all species, which include *Pinus sylvestris, P. pinaster, P. mugo, P. nigra* vars. *calabrica* and *austriaca, P. strobus, Picea abies, Pseudotsuga taxifolia, Larix decidua, Abies alba, Alnus incana, A. glutinosa, Betula verrucosa, Carpinus betulus, Castanea sativa, Quercus robur, Q. sessiliflora, Q. borealis, Corylus avellana, Laburnum anagyroides, Acer campestre, A. platanoides, A. pseudoplatanus, Fraxinus excelsior, Fagus sylvatica, Ulmus glabra, U. campestris, Robinia pseudoacacia, Salix caprea, Tilia platyphyllos, T. cordata, Populus tremula, Sorbus* spp. and *Prunus avium*.

832. *Mills, Their Functions and Products*

832.1. Sawmills and Planing Mills

See also Nos. 2455 *et seq.*, 2527–31, 2581–2, 2694.

2489. RAZOUS, P. **Les scieries à bois modernes et leur fonctionnement. [Modern sawmills and their operation.]** Dunod, Paris. 1952. pp. vii + 270. 32 refs. [F.] Price *Fr.*1550 [£1. 14*s.*]

Part 1 (pp. 3–56) deals with timber purchase and examination, log scaling, and the distribution, qualities and log grades of the most important European commercial species. Part 2 (pp. 59–151) describes in detail methods of sawing and the principal types of saw. Part 3 (pp. 155–263) deals with lay-out of sawmills, power, timber conveyors, grading of sawn wood, storage, assortments, and use of waste.

2490. CHARDIN, A. Méthodes américaines et sciage des bois tropicaux. **[The possible application of American methods to the sawing of tropical timbers.]** *Bois For. Trop.* No. 18/19, 1951 (126–38). [F.e.span.]

2491. **Lumber handling methods in the plant.** *Timberman* 53 (1), 1951 (59–60).

Summarizes discussion at the Sawmill Operating Conference held at Portland, Ore., in September 1951.

2492. **Breakdown methods in coast mills.** *Timberman* 53 (1), 1951 (56–7).

Summarizes discussion at the Sawmill Operating Conference held at Portland, Ore., in September 1951.

2493. BELL, G. E. **Factors influencing the manufacture of sawlogs into lumber in Eastern Canada.** *Bull. For. Br. Can.* No. 99, 1951. pp. 35.

Report of a series of studies to determine: what proportion of the sawlog was converted into lumber; the effect of (*a*) log diameter and length, and (*b*) the use of various types and combinations of sawmill machinery, and of various practices, on lumber recovery and sawing time; the causes and extent of non-productive periods; sawing accuracy of various types of sawmill machinery; and average volume of lumber sawn from logs of various sizes, and the overrun resulting from the use of the common log rules.

2494. CREIGHTON, J. W. **A simplified mill-study method for small sawmills.** *Quart. Bull. Mich. agric. Exp. Sta.* 34 (1), 1951 (115–29). 3 refs.

Indicates a simple graphical method by which a small-sawmill operator can determine which logs will yield a profit and which will not, at different stumpage prices.

2495. BELL, G. E. **A quick method of computing a lumber tally.** *Timber of Canada* 12 (3), 1951 (29–30).

The new self-checking method, already used in many mills, is illustrated by examples.

2496. MACDONALD, M. D. **The utilization of No. 3 Douglas-Fir lumber for prefabricated panels.** *Inform. Circ. Ore. For. Prod. Lab.* No. 5, 1950. pp. 31.

Presents the results of experimental fabrication of different types of panel, and an estimate of the serviceability of the various types.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-wood Assemblies

See also Nos. 2375, 2382, 2387, 2416, 2426, 2472 *et seq.*, 2482, 2496, 2509–13, 2550–2, 2584, 2611.

2497. MAÏEU, C. Usines de contreplaqué sur la Côte Pacifique. **[Plywood mills on the Pacific Coast.]** *Rev. Bois Appl.* 5 (6; 9/10; 11), 1950 (19–24; 9–13; 24–5). [F.]

An illustrated, detailed description of the organization of the Pacific Coast plywood mills, in three parts: (1) preparation of wood; (2) manufacture of veneer; (3) manufacture of plywood.

2498. SAKS, E. V. **Possibilities in the veneer and plywood industries.** *Timber of Canada* 12 (3), 1951 (26–8, 56–7).

Discusses some possibilities of increasing output by use of softwood species (Hemlock, Pine and Cedar), by greater use of *Betula papyrifera*, and by revising logging standards so that trees giving straight lengths shorter than 12 ft. are accepted. Describes briefly some of the unofficial log grading rules used by different veneer and plywood mills.

2499. SAKS, E. V. **White Birch moves to the veneer front in Canada.** *Veneers & Plyw.* 45 (9), 1951 (26, 28–9). P.R.

The shortage of Yellow Birch peeler bolts in Eastern Canada is bringing White Birch into greater use. Two new veneer mills have been erected in the White Birch region and are starting production in autumn 1951. Exact calculations of the amount of White Birch in North America are not available. According to Newfoundland sources, that country has a thousand million bd. ft. of Birch of 10 to 18 in. diameter. In Northern Quebec and Ontario many woods are 50% White Birch. Peeling and transport methods used in Scandinavian countries are described.

2500. APPELROTH, E. Haluaako vaneriteollisuutemme tosiaankin hyvää raaka-ainetta? **[Does our plywood industry really want good raw material?]** *Metsät. Aikak.* 1951 (5), (123–6). [Fi.e.]

Owing to the undiscriminating price policy of the plywood industry, the price of small and inferior Birch logs has been relatively high. Many logs have therefore been cut before reaching maturity or maximum quality. *From author's summary.*

2501. SARVAS, R. Raudusko vai hies vanerikoivuna parempi. **[Is *Betula verrucosa* or *B. pubescens* more suitable for veneer?]** *Metsät. Aikak.* 1951 (2/3), (51–3). [Fi.e.]

A study was made in some stands marked for felling for veneer. Results showed that: *B. verrucosa* had been marked in preference to *B. pubescens*; there was no difference in technical quality between bolts of the two species, but the mean cubic content of *B. verrucosa* was considerably higher. As a result of the preference for *B. verrucosa*, *B. pubescens* predominates on extensive areas. *From author's summary.*

2502. **Composite wood section. Trials of timbers for plywood manufacture. Progress Report 14. Preliminary tests on 2 species.** Forest Products Research Laboratory, Princes Risborough. 1951. pp. 9.

Description of veneer, data from processing trials, and notes on the appearance of the plywood are given for *Spondias mombin* and *Bursera simaruba.*

2503. **Composite wood section. Trials of timbers for plywood manufacture. Progress report 15.**

Consignment No. 711. African Mahogany—*Khaya ivorensis*. Forest Products Research Laboratory, Princes Risborough. 1951. pp. 14.

Gives data on processing trials, gluing properties, and veneer quality.

2504. HYLER, J. E. **Plywood can be curved into numerous unique patterns.** *Veneers & Plyw.* 45 (9), 1951 (16–8, 20–1). P.R.

An illustrated account of methods used to produce various items.

2505. **Vacuum and pressure drums for wood.** *Wood-Worker, Indianap.* 70 (7), 1951 (66–9). P.R.

Describes and discusses the use of autoclaves in 'bag-moulding' operations for the manufacture of compound-curved plywood components. Hot water seems to be the best medium for exerting pressure on rubber bags containing forms with glued veneer plied over them. Various types of autoclave doors are described.

2506. MILLER, D. G. **The manufacture of lumber-core plywood.** *Aust. Timb. J.* 17 (6), 1951 (395–400, 412–420).

Gives details of the manufacture of plywood having a core of edge-glued strips of sawn lumber, usually ¾ in. thick, emphasizing especially the steps needed to produce flat unwarped stock.

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

See also No. 2549.

2507. **Directory of building research and development organizations in Europe.** United Nations, Geneva 1951. pp. 111. [E.] P.R.

The directory gives addresses, fields of work, names of persons in charge, and some information on the structure, financing, and publications of national organizations in Europe, and 23 international organizations, concerned with building research and development. An introductory article outlines the evolution of building research. A name index and subject index are included. *From editors' summary.*

2508. **Timber and the Festival of Britain.** Timber Development Association Ltd., London. 1951. pp. [10].

A popular illustrated account of the use of wood in festival buildings in London and Bristol.

833.1. Building Components and Fittings: General

See also Nos. 2425–7, 2470, 2525.

2509. CRESTIN, F. **Lamella frames of wood: a recent example.** *Transl. Div. For. Prod.* [1951?] pp. 8. *Transl.* by S. Walker from *Rev. Bois Appl.* 5 (5), 1950 (17–20).

Describes the use of a lamella frame in a festival hall in France.

2510. KENNEDY, D. E. **The construction and testing of a glued laminated wooden arch of 47-foot span.** *Mimeo. For. Prod. Lab., Can.* No. *O*–152, 1950. pp. 11 + 6 photos, 3 dgms., 2 gphs. P.R.

Cf. *For. Abstr.* 12 (No. 1532).

2511. KÜHNE, H. Geleimte Holztragkonstruktionen (Leim und Holz). [**Glued supporting constructions (glue and timber).**] *SchrReihe öst. Ges. Holzforsch.* No. 2, 1950 (94–113). 21 refs. [G.] P.R.

2512. STAUDACHER, E. Geleimte Holztragkonstruktionen (Formgebung, Beanspruchung und konstruktive Durchbildung). [**Glued timber supporting constructions (shaping, stresses, and constructional applications).**] *SchrReihe öst. Ges. Holzforsch.* No. 2, 1950 (114–34). [G.] P.R.

2513. OSTERWALD, H. Geleimte Konstruktionen (Herstellung und Montage). [**Glued supporting constructions (manufacture and assembly).**] *SchrReihe öst. Ges. Holzforsch.* No. 2, 1950 (135–52). [G.] P.R.

2514. SCHOLTEN, J. A., and MOLANDER, E. G. **Strength of nailed joints on frame walls.** *Repr.* from *Agricultural Engineering, St. Joseph, Mich.* 31 (11), 1950 (551–5). P.R.

Presents the results of a study of nailed and strapped joints in frame walls. The U-strapped joints have been found to be distinctly superior at maximum loads to any other joint type tested. Of the two conventional types of joint, the toe-nailed ones with four 8d. nails were better than the end-nailed joints with two 16d. nails. Splitting of the wood was more noticeable in toe-nailed joints. Toe-nailing requires greater skill in assembly than other types of joint. The maximum loads for joints made of green wood and seasoned before testing, compared favourably with those for dry material, except end-nailing in tension tests, where the loads were ca. ½ those obtained with dry material. *From authors' conclusions.*

2515. [**The effectiveness of inter-joist strutting in distributing concentrated loads on board and joist floors.**] *Rep. For. Prod. Res. Bd., Lond. 1949,* 1951 (19–20).

A test was made on a floor consisting of 1-in.-thick, tongued-and-grooved boarding on 2 × 7-in. joists at 18-in. centres with one row of herring-bone strutting, subjected to a concentrated load at mid-span of the middle joist. It was found that the effect of the strutting in distributing the load was small compared with that of the boarding.

833.3. Special Uses in Factories and Workplaces

2516. BAECHLER, R. H., and RICHARDS, C. A. **Deterioration of wood in cooling towers.** *Trans. Amer. Soc. mech. Engrs.* 73 (8), 1951 (1055–9). 7 refs. P.R.

The significant properties of Redwood [*Sequoia*], the types of deterioration to which it is subject, and the conditions prevailing in cooling towers are reviewed. Pieces of slats removed from 12 towers after 6–8 years of service, and exposed to 5 fungi in laboratory tests, showed much greater [weight] loss in decay than pieces of unused Redwood. Thin cross-sections exposed to solutions of Na_2CO_3 and NaClO were less resistant to decay than those exposed to water. ***Authors' conclusion.***

833.8. Wood in Hydraulic, River and Marine Uses

See also No. 2550.

2517. MONEY, P. L. **Timber for coast defences.** *Quart. Rev. Timb. Developm. Ass.* 3 (3), 1951 (15–6).

A brief analysis of 50 answers to a questionnaire on the timbers in Great Britain used for walings, piles and land ties, dimensions required, life in service and performance of each timber, preservatives used and their effectiveness, and incidence of *Teredo* and *Limnoria*.

834. *Shingles. Cooperage. Packing Containers*

See Nos. 1800, 2387, 2602.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Uses etc.*

2518. BENSCHEIDT, C. Die Herstellung von Schuhleisten in Deutschland. **[The manufacture of shoe lasts in Germany.]** *Holz Roh- u. Werkstoff* 9 (9), 1951 (342–8). [G.g.] P.R.

The manufacture of shoe lasts by craftsmen came to an end when the copying lathe appeared. The mechanical manufacture of shoes gave a stimulus to the mechanical manufacture of shoe lasts and the result was the invention of the precision lathe, which is suitable for the turning of any irregular body. The steaming and seasoning of wood is of great importance in the manufacture of lasts. Special machines are used for finishing them. The utilizaton of waste, fire protection and accident prevention are discussed. *From author's summary.*

2519. GRAHAM, P. H. **Implement handle manufacture is specialized operation.** *Wood-Worker, Indianap.* 70 (10), 1951 (32–40). P.R.

Describes the manufacture by smaller specialized plants of wooden handles for various agricultural implements such as cultivators, ploughs, and planters.

2520. BARRY, R. L'industrie du bois à fuseaux. **[The spoolwood industry.]** *For. et Conserv.* 3 (10), 1951 (534–8). [F.]

Describes the sequence of operations involved in the manufacture of spoolwood.

2521. WATERHOUSE, J. **Timber and textiles.** *Timb. Tr. J.* 199 (3927), 1951 (1850–2).

Discusses the use of Hickory for picking sticks and of Dogwood (*Cornus florida*) and Persimmon (*Diospyros virginiana*) for shuttles.

2522. REHMAN, M. A., and KISHEN, J. **Treatment of Indian timbers for pencils.** *Indian For.* 77 (11), 1951 (699–701). [Forest Research Institute, Dehra Dun.]

Indian species found to be suitable for the manufacture of pencil slats are *Cedrus deodara, Juniperus macropoda, Cupressus torulosa,* and *Callitris rhomboidea.* The first of these, however, has many other uses and the others are scarce, so experiments have been made with some close- and straight-grained light hardwoods, to find a treatment that would make them suitable. It was found that impregnation with paraffin wax to the extent of 10–15% of the weight of the slats (treatment described) rendered *Hymenodictyon excelsum, Lophopetalum wightianum,* and *Michelia champaca* suitable. The wax was dyed red so as to give the finished product the appearance of Cedar wood. Details are given of hand tools designed at the Forest Research Institute, Dehra Dun, for the making of pencils as a home industry.

2523. VENET, J. Le jouet en bois. **[Wooden toys.]** *Rev. Bois Appl.* 6 (12), 1951 (19–22). [F.]

The following species are most used in France: Poplar, Lime, Alder, Aspen; Pine and Spruce are less used; for some toys Birch and Beech are employed.

2524. [FAIRBAIRNS, A. W.] **Specialised woods.** *Timb. Tr. J.* 199 (3927), 1951 (1849–50).

Discusses the use of Lignum Vitae for propeller-shaft bearings, and for bowls and skittle balls and cheeses, Degame [*Calycophyllum candidissimum*] for draughtsmen, Mahogany with Ebony edges for T-squares, and various woods for sports goods.

2525. HOLLAND, H. **Wood and music.** *Wood* 16 (12), 1951 (470–2).

Discusses the properties governing the choice of species for musical instruments, and for flooring, ceilings, walls, platforms and canopies, in concert halls.

2526. UGRENOVIĆ, A. Drvo za rezonanciju od Stradivarija do danas. **[Resonance wood from Stradivarius to the present time.]** *Predavanja održana u Jugoslavenskoj Akademiji* No. 5, 1951. pp. 38 + 13 photos. 34 refs. [Croat.] Published by the Jugoslavenska Akademija Znanosti i Umjetnosti, Zagreb.

Analyses the rôle of the various constructional parts of a violin and the properties desirable in their materials for good performance. The early centres of violin-making were developed in regions where Spruce (*Picea abies*) and Fir (*Abies alba*) forests were plentiful (Northern Italy, France, Bavaria, Saxony, Bohemia) because the wood of these species, especially Spruce, is the most homogeneous and isotropic of all European woods. In the first period, other species were also used, e.g. Pear, Lemon, and Ash. The main relevant property of Spruce wood is its high modulus-of-elasticity/sp. gr. ratio, responsible for the high conductivity of sound waves. The homogeneity and isotropic nature of Spruce wood depend on the tracheids being very long and forming up to 95% of the wood. Graphs are included showing how in Spruce (1) both the sp. gr. of the wood and the % of summerwood decrease as the width of the annual rings increases, (2) both the sound velocity and the modulus of elasticity increase together with the sp. gr., and (3) the velocity of sound increases with the pitch, and decreases as the wood's moisture content increases. [Cf. *For. Abstr.* 8 (No. 2627).]

836. *Furniture and Cabinet-making. Carving. Marquetry. Wooden Ornaments*
See Nos. 2471, 2476, 2611.

839.8. *Industrial Waste Wood and its Uses*
See also Nos. 2458, 2489, 2602, 2606, 2608–11.

2527. HANSEN, L. J. Sagbruksavfall som brensel. [**Sawmill waste as fuel.**] *Norsk Skogind.* 5 (10), 1951 (303–8). [Nor.e.] P.R.

Discusses the variations in heating value with species and type of waste (sawdust, chips, slabs, bark etc.) and describes, with illustrations, 8 types of furnace more or less adapted to burning sawmill waste.

2528. **Sawdust as fuel in Eastern Canada.** *Bull. For. Br. Can.* No. 101, 1951. pp. 8.

Tests have shown that sawdust is suitable as a fuel for domestic heating in Eastern Canada and that sawdust of all the species tested could be burned satisfactorily either dry or in the wet condition produced by most sawmills. Maple and Birch sawdust is a better fuel than Spruce and Balsam Fir or White Pine. Some suitable types of burner are described and illustrated.

2529. MAUNG, U WIN. **Wood waste utilization.** *Burmese For.* 1 (1), 1951 (14–5). [E.]

Describes a simple stove for burning sawdust as domestic fuel, made from a small drum (e.g. an oil drum). Costs are only ca. one-third those of burning wood. Most of the denser Burmese woods, especially Taukkyan [*Terminalia tomentosa*], Yon [*Anogeissus acuminata*] and Eng-Kanyin [*Dipterocarpus* sp.] provide sawdusts that give good, smokeless heat. Teak, because of its oil, is smoky. Sawdust from very light woods (e.g. Letpan [*Bombax malabaricum*] and Didu [*B. insigne*]) have low calorific value with high ash content and are very smoky. The sawdust must be well moistened, the optimum moisture content being 20–30%. Experiments are also being made in briquetting of sawdust under pressure, using $CuSO_4$ or $ZnCl_2$ with starch as a binder.

2530. KALSETH, L. Erfaringer med brikettering av sagflis og kutterspon. [**Making briquettes from sawdust and shavings.**] *Norsk Skogind.* 5 (11), 1951 (383–4). [Nor.] P.R.

Experience over more than a year, using a Danish press with a pressure of 50 tons, shows that good results are obtained from any normally dry sawdust and shavings, but not from material with a moisture content of over 23%. Briquettes with a moisture content of 13·1% had an effective calorific value of 3,242 calories/g. A trial with a mixture of 65% shavings and 35% sawdust weighing 57 kg. gave briquettes weighing 52 kg. A high proportion of sawdust gives better results, but good briquettes are obtained with 70% shavings and 30% sawdust; 80/20 mixtures are possible, but the briquettes are less firm. Production amounts to 3,200 kg./8-hr. day and the price obtained is Kr.90/ton. Two men can work the press.

2531. BERLINER, J. J., *et al.* [Compilers]. **Industrial utilization of sawdust.** J. J. Berliner and Staff, 840, Broadway, New York 3. [*n.d.*] pp. 51. 12 refs. P.R.

A mimeograph with the following sections: (1) wood plastics; (2) binders for moulding wood flour and sawdust; (3) sawdust mulch; (4) wallboard from sawdust; (5) sulphite pulps and papers from sawdust; (6) ethyl alcohol from sawdust; (7) sawdust composition for coating table tops; (8) oxalic acid from sawdust; (9) sawdust into hardboard; (10) manufacture of ball and roller bearings; (11) charcoal from controlled pyrolysis of sawmill wastes; and (12) varied uses of wood flour.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

841. *Wood Preservation*
See also No. 2517.

2532. KOKKINIS, J. To ergostasion empotismou tōn S.E.K. en Katerinē. [**The Greek State Railways impregnation plant at Katerini.**] *Dasos* No. 4, 1947 (43–50); Nos. 5; 6/7, 1948 (47–52; 57–64); No. 8/9, 1948/49 (43–50). [Gk.]

A full account of the plant, which was erected in 1939 according to German designs and direction. Occupying a total area of 28,000 sq. m., it is adapted for the Rüping process and Wolman salt treatment, the impregnation chamber (16 × 2·2 m.) taking a charge of 300 standard sleepers. The species used, Beech and Oak, last 30 and 25 years on the track. A variety of other railway timbers, e.g. telegraph poles and bridging members, are also treated.

2533. ROOSEN, P. Les tests d'appréciation de la durabilité naturelle ou artificielle du bois. [**Methods of testing the natural durability of wood and the durability of preservative treated wood.**] *Bull. Soc. for. Belg.* 58 (10), 1951 (393–415 + 2 plates). 16 refs. [F.]

2534. [**The effect of size and shape of test pieces on decay.**] *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (34).

In one experiment, Beech blocks exposed to *Polystictus versicolor* for 8 weeks at 22° C. lost weight as follows: blocks 10 × 2·5 × 1·25 cm., 21·1%; blocks 5 × 12·5 × 1·25, 31·5%; blocks 5 × 2·5 × 0·5, 49·1%. Some standardization, between laboratories, of size and shape of specimens, is obviously desirable for true comparability.

2535. VARNER, R. W., and KRAUSE, R. L. **Agar-block and soil-block methods for testing wood preservatives.** *Industr. Engng. Chem.* 43 (5), 1951 (1102–7). 18 refs. P.R.

Presents the results of an investigation in which the agar-block method of the National Woodwork Manufacturers Association and the soil-block method were critically compared. Similar ratios of effectiveness were in some cases established with the two preservatives used. With the soil-block method a larger % of rot was observed in specimens with little or no preservative. The agar-block method

requires less time. The varying chemical composition of the soil may have an adverse effect on the standardization of the soil-block method.

2536. **Standard methods for testing tar and its products.** Standardization of Tar Products Tests Committee, London. 3rd ed., 1950. pp. x + 470. Price 30*s*. P.R.

2537. COLLEARY, M. J. **Absorption and penetration of Greensalt solutions in mountain Douglas Fir and Eastern Spruce.** *Mimeo. For. Prod. Lab. Can.* No. *O*–160, 1951, pp. 10 + 5 photos. P.R.

Penetration of Greensalt (aqueous solution containing 2·5% $K_2Cr_2O_7$, 1·5% $CuSO_4.5H_2O$, and 0·5% $As_2O_5.2H_2O$) in both sapwood and heartwood of seasoned mountain Douglas Fir was found to be light and unsatisfactory and was not improved by preliminary steaming. Fair though not complete penetration was obtained in sapwood of green Douglas Fir posts; a rather light but complete sapwood penetration was obtained when these posts were previously steamed. Penetration in both green and seasoned Spruce posts without steaming was light and irregular. Preliminary steaming resulted in deeper penetration. *From author's summary.*

2538. HARROW, K. M. **Leachability of some water-soluble wood preservatives.** *N.Z. J. Sci. Technol.* 32 (6), 1951 (33–40). 9 refs. P.R.

An experiment was made to determine the extent to which leaching occurred when building timbers, impregnated with H_3BO_3, Tanalith, or $ZnCl_2$, were exposed to the weather for periods up to 6 months. Changes in loading of preservatives were determined by chemical analysis of cross-section and layer samples taken from unexposed and exposed timbers. Losses of H_3BO_3 and Tanalith materials from wood in 6 months were 30–60%, and that of $ZnCl_2$ between 16 and 24%. Leaching was chiefly from the outer layers. *From author's summary.*

2539. SPILLER, D. **Toxicity of arsenious oxide, sodium fluoride, zinc chloride, and some other materials, to the common house borer, *Anobium punctatum* de Geer.** *Repr.* from *N.Z. J. Sci. Technol.* 32*B* (3), 1950 (1–7). 4 refs.

Tests have shown that impregnation with $ZnCl_2$ in quantities equal to 0·18% of the dry weight of wood, prevents development of *Anobium* larvae. At 0·11% and below, larvae were able to survive. Comparable figures for other materials are: NaF 0·19–0·12%, $ZnSO_4$ 0·9–0·53%, thiourea 0·25–0·10%, Na_3AsO_4 ⩽ 0·5%, $CuSO_4$ ⩽ 0·25%, $BaCl_2$ > 1·0%, urea > 4·0%. As_2O_3 was completely toxic at 0·021% and showed considerable toxicity even at 0·005%. *From author's summary.*

2540. GAUMANN. Phenols chlorés et protection du bois. **[Chlorinated phenols and preservation of wood.]** *Rev. Bois Appl.* 6 (9/10), 1951 (48–9). [F.]

French translation of a report on tests conducted on the use of Xylophène S.O.R. (Societé Xylochimie).

2541. SANDERMANN, W., and JONAS, G.-Z. Über den Nachweis und die Bestimmung der Eindringtiefe von Pentachlorphenol. **[Detection and determination of the penetration depth of pentachlorophenol.]** *Holz Roh- u. Werkstoff* 9 (8), 1951 (298–300). 3 refs. [G.g.] P.R.

A modified Beilstein test can be advantageously used as a preliminary test for the analysis of substances containing pentachlorophenol and of timbers impregnated with them. Pentachlorophenol is extracted with alcohol, or obtained by sublimation, from the test samples. The best method for determining the penetration depth is that based on oxidation with gaseous ClO_2 to obtain chloranil which transforms the dimethylaniline spray into 'methyl violet'.

2542. LIESE, W. Über die Eindringung von öligen Schutzmitteln in Fichtenholz. **[Penetration of oily wood preservatives into Spruce wood.]** *Holz Roh- u. Werkstoff* 9 (10), 1951 (374–8). 8 refs. [G.g.] P.R.

A review of literature on the poor absorption of oily preservatives by Spruce wood is followed by a description of an experimental investigation. It has been established that this phenomenon is caused by the irreversible closing of the bordered pits of springwood during drying. These pits are always open in summerwood, closed in spring heartwood, and open in spring sapwood. When sapwood is dried, the bordered pits in the springwood close. Hence oils can penetrate into only summerwood of air-dry timber, springwood being hardly entered by oil and the rays completely impenetrable. The author's treatment of air-dry wood with various chemicals and solvents failed to open the closed pits to any appreciable extent. When, however, green wood was treated with ethanol or acetone, the pits were kept open, and the wood could be impregnated throughout (sapling disks of up to 7 cm. diam. and 5 cm. thick, almost without heartwood, were used). It appears that the closing of the pits is prevented by the low surface tension of these liquids.

2543. BENNETT, R. G., and BINNS, E. J. **The preservation of wooden transmission poles.** *Timber News* 59 (2149), 1951 (478–80).

A detailed historical account for the United Kingdom over the last 80 years.

2544. NARAYANAMURTI, D. **Note on treated wooden transmission poles in India.** *Indian For. Bull.* No. 140, 1948. pp. 43 + 13 photos, 4 dgms. 7 refs.

An illustrated account, with sections on: species of wood recommended for use as poles; causes of deterioration; quality and defects; preparation of poles for treatment; preservatives; treating processes; erection of poles, extension of life of partly decayed poles, and service data on treated poles.

2545. NEKRASOV, M. M. Perehod impuljsnogo perekrytija v dugu na linijah peredači s derevjannymi oporami. **[Transition of an impulse flashover into an arc on transmission lines on wooden supports.]** *Električestvo, Moskva* No. 3, 1951 (7–10). 10 refs. [Russ.r.] L.S.

Both impregnated and non-impregnated poles were studied and previous laboratory findings for different timber species confirmed, viz. that the use of impregnated timber (Pine impregnated with creosote) not only increases the service period of the supports but also raises the lightning-immunity of the lines. This is primarily due to the closing of the pores of the timber.

2546. WALTERS, C. S., and MEEK, W. L. **The cold-soak preservative treatment of Eastern Red Cedar.** *For. Note Ill. agric. Exp. Sta.* No. 27, 1951. pp. 1.

Satisfactory penetration was obtained by cold-soaking *Juniperus virginiana* fence posts in a diesel-oil solution of pentachlorophenol.

2547. WALTERS, C. S., and MEEK, W. L. **Report on Project 301-A. Preservative treatment of fence posts by cold-soaking in pentachlorophenol/fuel-oil solutions.** *For. Note Ill. agric. Exp. Sta.* No. 28, 1950. pp. 2 + 2 tbls.

Cf. *For. Abstr.* 12 (No. 2196).

2548. WALTERS, C. S., and MEEK, W. L. **The cold-soak preservative treatment of Sassafras posts.** *For. Note Ill. agric. Exp Sta.* No. 26, 1951. pp. 1.

Satisfactory penetration was obtained by cold-soaking fence posts of *Sassafras albidum* in a fuel-oil solution of pentachlorophenol.

2549. **Preservative treatments for timber in buildings.** *British Standard Draft Code of Practice, British Standards Institution, London* No. *CP* (*B*) 1020, 1951. pp. 18. Price 2*s*. P.R.

Contains sections on: materials, design considerations, work on site, inspection and testing, and maintenance, as well as a table of preservatives and methods of application.

2550. RICHARDS, I. T. **Creosoted Douglas Fir plywood pontoons for marine use.** *Wood Pres. News* 29 (11), 1951 (134–6, 144). P.R.

Many pontoons in British Columbia are now being made from pressure-creosoted Douglas Fir plywood, which has proved much more resistant to marine borers than Red Cedar floats. Creosote penetration is complete, the retention per cu. ft. being 24 lb. for salt-water use and 12 lb. for freshwater use.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

2551. DALTON, L. K., FITZGERALD, J. S., and HATT, H. H. **Investigations of phenolic resins for making improved wood, 1942–44. I. Preparation and examination of the resins.** *Aust. J. appl. Sci.* 2 (2), 1951 (288–305). 17 refs. P.R.

2552. KÜCH, W. Über die Vergütung des Holzes durch Verdichtung seines Gefüges. [**Improving wood by densification.**] *Holz Roh- u. Werkstoff* 9 (8), 1951 (305–17). 13 refs. [G.g.] P.R.

Presents, with tables and graphs, the results of a systematic investigation of the effects of press compression on the physical and mechanical properties of laminated wood, improved wood, and various kinds of solid wood (Birch, Beech, Alder, Pine, and Fir). The pressures used varied from 10 to 150 kg./sq. cm., and the sp. gr. of test pieces from 0·45 to 1·42 g./c.c. When comparing the test pieces prepared from different species and compressed to the same sp. gr., it was found that, for laminated wood of 0·8 g./c.c. and for improved wood of 1·3 g./c.c. sp. gr., the longitudinal tensile strength was highest for Birch, followed by Alder, Pine, Fir, and Beech. The compression strength, however, seems to be independent of species. In the case of improved wood with sp. gr. above 1·2–1·3 g./c.c., the mechanical properties of the hardwood (especially Birch and Beech) laminae deteriorated, while those of the softwood laminae considerably improved. Plates were obtained from laminated softwood having a tensile strength up to 3,450 kg./sq. cm. and modulus of elasticity (E) of 410,000 kg./sq. cm. Laminated softwood had a much higher E than laminated Beech of the same sp. gr.

843.3. *Fireproofing and Fire Resistance*

See also No. 2415.

2553. SUGGITT, J. W. **The evaluation of fire-retardant paints: types compared by improved test methods.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1198 (*F*–3), 1951. pp. 6.

Laboratory fire-tube and flame-spread tests using 6 types of paint on wood panels, showed that coatings of the best paints (resin phosphate or sulphamate) over 3 coats of oil paint, prevented destruction of the specimen. A table is given showing fire-retardant quality, ease of application, covering power, drying time, type of surface and washability of the different types.

2554. Essais de revêtements ignifugés à partir de certaines formules du Laboratoire forestier de Madison. [**Tests of fire-retardant coatings developed at the Forest Products Laboratory, Madison.**] *Rapp. Fonds for. nat. Jan./Dec. 1950, Annexe XI* 1951 (15–8). [F.]

[Cf. *For. Abstr.* 8 (No. 493).] The disadvantage of all these preparations was found to be that they did not adhere well to the wood and weathered badly.

844. *Attack by Plant Organisms*

See also No. 2516.

844.1. Sap-staining Fungi

See also Nos. 2263, 2387, 2575.

2555. RENNERFELT, E. Über den Zusammenhang zwischen dem Verblauen des Holzes und den Insekten. [**The connexion between sap-stain fungi of wood and insects.**] *Oikos* 2 (1), 1951 (120–37). 21 refs. [G.g.] [Forest Research Institute of Sweden, Experimentalfältet.]

Unbarked Pine wood attacked by *Blastophagus minor*, *B. piniperda*, and *Ips acuminatus*, and Spruce wood attacked by *Ips typographus*, were examined for the presence of blue-stain fungi. *Ophiostoma canum* and *Trichosporium tingens* were found in more than 50% of the samples of wood attacked by *B. minor* and were also isolated from larvae and imagos; other stain fungi and moulds occurred more sporadically. No blue-stain fungi were found regularly in the tunnels of *B. piniperda*, and though *O. pini* was isolated in some cases, the wood may well have been infected earlier by wind-borne spores. The association of *Ips acuminatus* with *O. pini* is more probable, and two other species of *Ophiostoma* were found in numerous cases. *O. penicillatum* occurred regularly in tunnels of *I. typographus* in Spruce; numerous yeast fungi were

also isolated. *Cladosporium herbarum* and *Pullularia pullulans* were found in some tunnels, but not in such numbers that they could be definitely associated with any particular insect. *From author's summary.*

844.2. Wood-destroying Fungi

See also Nos. 1858, 2254–6, 2387, 2533–5.

2556. BAVENDAMM, W. Pflanzliche Holzschädlinge. *Merulius lacrymans* (Wulf.) Schum. ex Fries. [Plant agencies injurious to wood: *M. lacrymans.*] *Holz Roh- u. Werkstoff* 9 (6), 1951 (251–2). 14 refs. [G.] P.R.

The first of a new series of monthly features summarizing information on plant agencies injurious to wood, their biology, detection, prevention and control, plus a short bibliography. The text contains photographs. Usually 2 pp.

2557. BAXTER, D. V. **Some resupinate polypores from the region of the Great Lakes. XXI.** *Pap. Mich. Acad. Sci.* 35, 1949 (1951), (43–59 + 6 plates). 25 refs. L.S.

Deals with morphology, habitat and distribution. Special reference is made to *Fomes subroseus*, a fungus that attacks both felled and standing timber, and some measures are described for controlling the fungus in the forest, at the sawmill and in timber in use.

845. *Attack by Animals*

845.1. Marine Borers

See also Nos. 2517, 2550.

2558. RAY, D. L., and JULIAN, J. R. **Occurrence of cellulase in *Limnoria*.** *Nature, Lond.* 169 (4288), 1952 (32–3). [Department of Zoology, University of Washington, Seattle.]

Investigation of the modes of nutrition of *Limnoria lignorum* established the probability that an enzyme capable of catalysing the hydrolysis of cellulose is present in the enteric diverticula of *Limnoria*.

2559. WOODS, R. P. **Examination of marine borer experiment at Shoreham Harbour.** *Quart. Rev. Timb. Developm. Ass.* 3 (2), 1951 (11, 16).

Results are presented of the periodic examination of specimens of 10 tropical woods for their resistance to *Teredo*. After a 9-months' immersion, 6 species showed no visible signs of damage.

845.2. Terrestrial Borers

See also Nos. 2185–6, 2189, 2308, 2539, 2555.

2560. **Control of the predaceous mite, *Pediculoides ventricosus.*** *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (44–5).

Discusses the results of experiments on methods of controlling *P. ventricosus* infesting insect cultures and experimental material, without harming *Lyctus* and common furniture beetles and their larvae. A 2% solution of β-naphthol in 97% alcohol has been found effective.

2561. **Horchgerät zur Feststellung holzbohrender Käferlarven. [Sound apparatus for the detection of wood-boring beetle larvae.]** *Holz Roh- u. Werkstoff* 9 (6), 1951 (242–3). [G.] P.R.

An illustrated description of a new portable apparatus, made by a Frankfurt firm, by which sounds are amplified 10,000 times.

2562. QADRI, M. A. H. **Table of some of the more important forest and timber pests of West Pakistan.** *Pakistan J. For.* 1 (3), 1951 (238–40).

Gives name, host, locality and nature of damage of 24 species.

2563. CHATTERJEE, N. C., and CHATTERJEE, P. N. **Insect borers of newly felled timber and their control, Part 2. The Bombay investigations of 1947–49.** *Indian For.* 77 (12), 1951 (740–6).

The first part of this investigation, for Madras, was published in 1947 [cf. *For. Abstr.* 10 (No. 1955)]. The present article deals with borers of *Terminalia belerica, T. tomentosa, Adina cordifolia* and *Eugenia jambolana.* Data on the various groups of borers and types of damage are tabulated. The simplest method of protecting all these timbers is to remove the bark and keep them in the sun after removal from the forest. *E. jambolana* is, however, very resistant, and may be left with bark intact.

2564. KURENCOV, A. I. O sohranenii lesomaterialov manjčžurskogo jasenja ot povreždenii nasekomymi v uslovijah nasaždenija. [The protection of Manchurian Ash logs against insects during storage in the forest.] *Priroda, Moskva* 40 (8), 1951 (78–80). [Russ.] A.P.B.

The most important pests of *Fraxinus mandshurica* logs in the forests of the Maritime Province of the Soviet Far East, are the beetles *Mesosa miops, Xyleborus saxeseni, Scolytoplatypus tycon*, and 7 species of *Hylesinus.* The last group are the most abundant. They bore only in sapwood but, when in large numbers, cause much indirect damage by giving entry to fungi and by hastening the drying out of the logs and thus encouraging the development of shakes. The author's studies show that these pests fall into two groups as regards their life cycle:—(1) attack starting in May; cycle completed by autumn of the same year; and (2) attack starting at the end of June; over-wintering and not completing the cycle until the next year. The greatest danger period is from mid-May to mid-August; hence, if possible, timber from winter fellings should be extracted before this period, and summer fellings postponed until late August. Conditions are relatively unfavourable for the beetles under a canopy of density 0·5 or more, and on clear fellings of 2–3 ha. and upwards. They are most favourable in small openings up to about 1,000 sq. m. in area, with a mesic microclimate. When logs cannot be extracted, two methods of summer storage are therefore indicated: (*a*) Moist storage under as dense a canopy as possible. Logs to be closely stacked on low foundations (10–15 cm. high) in single (large logs) or double (small logs) tiers, and covered, including the ends and sides, with a layer 20 cm. deep of herbaceous material and branches; stacks to be well spaced out over the area. (*b*) Dry storage on large clear fellings. Stacks to be built 2–3 m. apart, on high (0·7–1 m.) foundations, leaving 10–15 cm. between adjacent logs, with a single tier, the ends facing east and west. Logs to be turned periodically

to expose all sides to the sun. Site to be cleared of all shrubs and herbaceous growth. End coatings should be applied to reduce the much greater risk of splits developing.

2565. BROWNE, F. G. **Test of Chlordan against ambrosia beetles.** *Malay. Forester* 14 (2), 1951 (98).

Spraying logs of *Shorea leprosula* with Chlordan as a protection against ambrosia beetles in the forest gave negative results, but apparently protected the logs against an unidentified bark-boring weevil.

2566. PURUSHOTAM, A. **A short interim note on temporary preservative measures to be adopted in the case of timbers amenable to deterioration during transit and storage.** *Indian For.* 77 (11), 1951 (716–9). 3 refs.

Includes a table showing concentrations, quantities, costs etc. for spraying logs or lumber with ASCU-boric, boric acid, $CuSO_4$, $Na_2Cr_2O_7$, $ZnCl_2$, or γBHC.

2567. **Starch depletion in the log.** *Rep. For. Prod. Res. Bd., Lond. 1949*, 1951 (10–1).

Work on the manner in which starch reserves in the sapwood of a newly felled log may become depleted below the limit at which *Lyctus* will attack, has been resumed. Laboratory experiments show that, when Ash billets are stored in water at temperatures from 64 to 99° F., only a moderate increase in the rate of starch depletion is obtained since, above 70°, depletion appears to be inhibited, presumably by the accumulation of respiratory gases in the interior of the log. [Cf. *For. Abstr.* 11 (No. 1906).]

2568. SCHMIDT, H. Tierische Holzschädlinge. *Hylotrupes bajulus* L. **[Animal pests of wood: *H. bajulus*.]** *Holz Roh- u. Werkstoff* 9 (8), 1951 (331–2). 10 refs. [G.] P.R.

The first of a new series of monthly features (usually two pages) summarizing information on animal timber pests, their biology, detection, enemies, prevention and control, as well as a short bibliography. The text is illustrated with photographs, diagrams or graphs.

2569. TAMBLYN, N., and KENT, N. E. **The horntail wood wasp.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 185, 1951 (4).

Illustrated description of a *Sirex* species, specimens of which have been recently discovered in large shipments of softwood timber imported from Europe to Australia, where there have previously been no records of native or introduced species of this genus.

2570. **Borer lines. Control of the large carpenter bee, *Xylocopa*.** *Pest Control* 19 (9), 1951 (32, 34). D.S.I.R.

Briefly describes the life cycle of *X. virginica*, and the damage done to woodwork by this insect. Since neither the bee nor its larvae feed on wood, which is only perforated for shelter in which to rear the young, control is rather difficult.

845.3. Termites

2571. SCHMIDT, H. Tierische Holzschädlinge. Termiten (Isoptera). **[Animal pests of wood: termites.]** *Holz Roh- u. Werkstoff* 9 (9), 1951 (371–2). 10 refs. [G.] P.R.

2572. **Soil fumigation can eliminate termite infestation in cold joint failure.** *Pest Control* 19 (8), 1951 (29). D.S.I.R.

A 15% solution of $C_2H_4Br_2$ in 350°-flash-point petroleum solvent was used as soil fumigant within a practically airtight, reinforced-concrete warehouse infested with termites that fed on wood shelving and cellulose material stored on shelves. The dose used was 4 oz. per 1,000 cu. ft. (double the lethal dose). The fumigant was poured through holes drilled in the floor slabs, and the holes were re-sealed. No re-infestation has been reported in over 3 years.

847. *Drying* (*Seasoning*)

See also Nos. 2387, 2480, 2694.

2573. KEYLWERTH, R. Betriebsblatt 1. Die Kammertrocknung von Schnittholz. **[Service sheet 1. Chamber drying of converted timber.]** *Holz Roh- u. Werkstoff* 9 (7), 1951 (289–92). 18 refs. [G.] P.R.

The first of a new serial feature in this journal, giving information on various aspects of factory operations.

2574. MCMILLEN, J. M. **How can Black Walnut gunstock blanks be kiln dried without honeycombing?** *Wood, Chicago* 56 (12), 1951 (49–50). P.R.

Hot-dip pitch/asphalt end-coating and a proper kiln-drying schedule are recommended.

2575. KOLLMANN, F., KEYLWERTH, R., and KÜBLER, H. Verfärbungen des Vollholzes und der Furniere bei der künstlichen Holztrocknung. **[The discoloration of solid wood and veneer during artificial seasoning.]** *Holz Roh- u. Werkstoff* 9 (10), 1951 (382–91). 84 refs. [G.g.] P.R.

The principal causes of discoloration during seasoning were investigated and assessed for Beech, Maple, and Oak wood, findings being discussed under the heads:—(1) combined action of temperature and moisture; (2) oxidation; (3) deposition of coloured wood components on the wood surface; (4) fungi; and (5) contact with metals. (1) Darkening begins at ca. 60° C. in hardwoods and ca. 90° C. in softwoods, and shows linear increase with temperature; it begins at ca. 9% moisture content, shows linear increase with increasing moisture content, and reaches the colour of steamed wood at fibre-saturation point. Temperature/moisture darkening is caused by chemical changes, particularly hydrolytic reactions. (2) This type of discoloration is encountered only in hardwoods subjected to mild seasoning. (3) Occurs in Oak and other woods rich in tannins. (4) Discoloration caused by moulds and blue-stain fungi occurs only with mild seasoning schedules. (5) Is due mostly to the formation of metal/tanstuff compounds.

2576. KOLLMANN, F. Trätorkningens utveckling. **[The development of timber seasoning.]** *Medd. Svenska Träforskn Inst. (Trätekn. Avd.)* No. 13*B*, 1951. pp. 9. 58 refs. [Sw.sw.] P.R.

Reviews different methods of seasoning including chemical, high-frequency and infra-red methods.

2577. WRIGHT, G. W. **Kiln design and some accelerated drying processes used overseas.** *Aust. Timb. J.* 17 (7), 1951 (485–94).

Discusses types of kiln seen in 1949 in Sweden, Finland, England, France and the U.S.A., describing in some detail: a French installation with two double-line, longitudinal-shaft, internal-fan compartment units; large Swedish kilns used by the Korsnäs A.B. at Gävle; a Swedish plant with three circular chambers about 23 ft. in diameter for seasoning timber centrifugally [cf. next abstract]; and the Taylor-Colquitt vapour-drying process.

2578. KASTMARK, C. F. Avvattning av virke genom centrifugering. **[Removing free water from timber by using centrifugal force.]** *Pap. ja Puu* 33 (11), 1951 (346–52). [Sw.e.] P.R.

Samples of Pine and Spruce varying in size from 4 in. × 9 in. × 17 ft. to $\frac{5}{8}$ in. × 3 in. × 6 ft. were steamed for 4 hr. and then dried experimentally in a cylinder with an inner diameter of 6·8 m., rotating on an axis perpendicular to the length of the timber, at 38–40° C. The cylinder had two openings, diametrically opposite, for inserting and removing the timber. About 300 charges, covering 1,300 samples, were dried. The samples were weighed before insertion, and were removed and reweighed after 1, 3, 5, 7, 9, and 24 hr. Centrifuging was carried out at 50, 60, 75, 90 and 120 revs./min. After centrifuging, drying was completed in an ordinary kiln. Figures showing the relationship between the speed of revolution and the weight of water per cu. ft., and the moisture gradients in the timber, are given in graphs. The following results were obtained: (1) The moisture content was roughly uniform for the same dimensions. (2) The moisture was driven out from the wet inner zone early in drying; drying could therefore take place more evenly throughout the whole section, and there was little or no splitting or checking. (3) The yellow colouring was very much less than in kiln-dried timber. (4) The time needed for kiln drying was reduced by about a half. (5) Optimum speeds were 58–60 revs./min. for timber 1 in. thick and over, and 90 revs./min. for timber $\frac{5}{8}$ in. thick. (6) Most of the water was removed during the first 4 hr. and it was not found economical to carry out the entire seasoning process by centrifuging. (7) Timber containing a high proportion of heartwood is not suitable for centrifuging, since it contains little free water.

Diagrams are given showing the lay-out of an installation using a centrifuge, and the details of a centrifugal drier. From 1945 to 1947, $\frac{5}{8}$- $\frac{3}{4}$- $\frac{7}{8}$-, and 1-in. sidings were dried commercially in centrifuges. The power consumption was about 12·5 kw per centrifuge charge. Centrifuging was economic only when the wood contained a certain proportion of water (at least 50–55% of its volume). The results obtained were similar to those obtained in the laboratory. [Cf. *For. Abstr.* 13 (No. 1674) and preceding abstract.]

848. *Timberyard Practice. Handling and Storage of Timber*

See also Nos. 2563–7.

2579. WOOLLEY, R. B. **Recent lumber yard fires stress inherent hazards.** *Fire Engng.* 104 (1), 1951 (26–32). D.S.I.R.

A comprehensive illustrated account and study of over 30 fires that occurred in the U.S.A. between October 1 and December 20, 1950. The lay-out and other factors that affect fire hazard are stressed, and some preventive measures are suggested, viz. improved inter-communication, exclusion of trespassers, lower and better spaced stacks, use of windbreaks, cutting grass (brush, woods) for at least 100 ft. round lumber yards, erection of concrete baffle walls etc.

2580. WARBURTON, J. A. **Log block piles inventoried by air at savings of thirty per cent.** *Pulp Paper Mag. Can.* 52 (12), 1951 (119–20).

A large Canadian paper company tested this new method of determining contours and volumes of 10 blockpiles in the Ottawa valley. An Avro Anson plane flew over the blockpile areas at ca. 1,500 ft. altitude and took a stereo pair of photographs, overlapping about 55%, of each area. Normally 2 horizontal distances and 4 vertical positions are needed as key points for each pair of photographs. Chain and level were used for ground control. The air photographs were studied with stereo-plotting instruments, which gave a 3-dimensional view of the entire blockpile, from which a detailed topographic plan could be produced. The maps delivered to the company were compiled at 5-ft. contour intervals on a horizontal scale of 65 ft. = 1 in. In a comparison of air- and ground-survey results, 7 blockpiles agreed within less than 1%, 3 differed by 2·03%, and the last by 6·43%; the company considered, however, that for this very irregular pile the air survey was probably the more accurate, as danger of wood slides prevented a complete ground survey. Costs vary with the number of piles, their size, availability of aircraft etc., but a saving of 25–30% is probable and the maps are ready in 7–10 days instead of taking several weeks.

2581. BERG, W. Gaffeltruckens anvendelse i trelastindustrien. **[The use of fork trucks in the timber industry.]** *Norsk Skogind.* 5 (11), 1951 (368–75). [Nor.e.] P.R.

Discusses the design and costs of fork trucks and the uses of fork and straddle trucks in the sawmill industry.

2582. **The 'Timber Wolf'.** *Timb. Tr. J.* 199 (3926), 1951 (1698–700).

Short account (illustrated) of the 'Timber Wolf', a straddle carrier for use in sawmills and timberyards, now in production at the works of the manufacturers, Pest Control Ltd. of Bourn, Cambridge. The design of the machine is based on that of the special high-clearance tractors developed by the same company for treatment of high crops and bush fruit-trees. Weights up to 5 tons, are easily dealt with and the carrier is designed to carry timber baulks up to 42 in. wide by 48 in. high with a maximum weight of 7½ tons. Steering on the rear wheels gives the vehicle a minimum inside turning radius of 9 ft. The total width of the machine is 7 ft. 6 in. Careful design has resulted in a driving position at the rear of the carrier, which provides a good view through the frame for manoeuvring on to loads. A very smooth and efficient system of working is obtainable when these carriers are used to take

timber directly to the machine line. The power-transmission systems are completely enclosed; drives to the wheels and to the lifting mechanism are in most cases running in oil baths. There is a single-control 6-speed (3 forward and 3 reverse) gearbox which simplifies driving. Power is provided by the 'Perkins' 6-cylinder diesel engine, chosen partly because a diesel engine reduces fire hazard in timberyards, mills etc.

85. GRADING OF WOOD AND WOOD PRODUCTS

See also No. 2489.

852. *Detection, Recognition and Assessment of Injuries and Defects*

See Nos. 2453, 2575.

853. *Grading of Logs*

See also No. 2498.

2583. STERMITZ, R. E. **Relationship between log characteristics and lumber grade recovery in second-growth Douglas-Fir.** *Abstr. of thesis*, in *J. For.* 49 (9), 1951 (652).

Gives a classification of logs into 3 classes based mainly on presence or absence of clear quarters and maximum knot size.

2584. ALLEN, J. W. **No. 3 Douglas Fir peeler logs.** *Circ. Inst. For. Prod., Wash.* No. 18, 1951. pp. 4.

The quality requirements and permissible defects are described and illustrated by photographs.

854. *Grading of Converted Timber*

2585. REID, J. S. **Grading of New Zealand grown Insignis Pine (*Pinus radiata*).** *Aust. Timb. J.* 17 (6), 1951 (425–36).

Discusses the characteristics of the tree, and comments on the uses of the different grades and on the grading rules.

2586. LATHAM, J. D. **Grading of hardwoods. 3. Colonies.** *Emp. For. Rev.* 77 (4), 1951 (342–58).

Covers British Guiana, British Honduras, Gambia, Gold Coast, East Africa, Malaya, Nigeria, North Borneo, Nyasaland, Rhodesia, Sierra Leone, Trinidad and Tobago. [Cf. *For. Abstr.* 13 (Nos. 1683–4).]

86. PULP INDUSTRIES. CHEMICAL UTILIZATION OF WOOD

See also Nos. 2387, 2694.

861. *Paper and Cardboard Industry (Pulp, Paper, Cardboard, Fibreboards)*

See also Nos. 2324, 2375–8, 2387, 2662.

Pulping and Pulp

See also Nos. 2433 *et seq.*

2587. FIRESTONE, J. T. **Salinity of salt water-borne wood.** *Tappi* 33 (6), 1950 (260–2). 3 refs. P.R.

Results of an investigation into the amount of inorganic salts introduced into the pulping system at the Everett pulp mill of the Weyerhaeuser Timber Co. Of the chips used, ca. 73% came from salt-water-borne logs. It has been found that 5·1 lb. of salt was introduced into the pulping process for each ton of air-dry chips. [Cf. *For. Abstr.* 12 (Nos. 1462–3).]

2588. ADLER, E. **Sulfite pulping properties of Spruce wood from unpeeled floated logs.** *Svensk PappTidn.* 54 (13), 1951 (445–50). 9 refs. [E.e.g.sw.] P.R.

The surface layer, about 5 mm. thick, of wood from Spruce logs that have been floated or stored in water unbarked is largely resistant to sulphite pulping. This layer turns violet when moistened with 1 part H_2SO_4 in 4 parts methanol. It was found that this colour reaction is caused by catechol tannins (flavotannins), which have passed from the bark into the sapwood during immersion. [Cf. *For. Abstr.* 13 (No. 1701).]

2589. JONES, G. W. **The effect of sodium peroxide bleaching on the components of Eastern Spruce groundwood.** *Tappi* 33 (3), 1950 (149–60). 23 refs. P.R.

It has been found that Na_2O_2 does not cause any large-scale chemical changes in the known components of Spruce groundwood. During normal bleaching, lignin consumes ca. 40% and holocellulose ca. 60% of Na_2O_2. Ether and ethanol extractives are responsible for only 1–4% of Na_2O_2 consumption. The major bleaching effect is probably due to the reaction of Na_2O_2 with lignin, primarily through a portion of the carbonyl groups in the lignin structure. It has been found that lignin consists of two or more fractions that differ only in their colour and reactivity toward Na_2O_2. It is suggested that the bleaching effect may be due to a chemical reaction between the more highly coloured fractions and Na_2O_2. *From author's summary.*

2590. COSTA, M. V. L. FIRMINO DA. Contribuição para o estudo das pastas químicas de pinheiro bravo. **[The study of chemical pulps from *Pinus pinaster*.]** *Publ. Serv. flor. aquic. Portugal* 13 (1/2), 1946 (59–143 + 3 plates). 39 refs. [Port.port.e.]

Discusses possible resources of Portugal in *Pinus pinaster* for pulp production and describes experiments in pulping this species by the soda process. Particular factors studied were: (1) age, (2) rate of growth, and (3) bark %. Cooking for 5 hr. at a pressure of 7 kg./sq. cm. with 30% of soda estimated on dry weight of wood, produced a pulp suitable for use in industry, but not adapted to bleaching. The relationship of age of the wood to the mechanical properties of the pulp was negligible, but values for the permanganate number and the lignin content decrease with increasing age of the wood. No correlation was found between pulp properties, the average diameter increment, and bark %. [Cf. *For. Abstr.* 12 (No. 3179).]

2591. COSTA, M. V. L. FIRMINO DA. A variação das dimensões das fibras em duas pastas de pinheiro bravo. **[Variations in fibre dimensions in two *Pinus pinaster* pulps.]** *Publ. Serv. flor. aquic. Portugal* 14 (1/2), 1947 (5–27). 12 refs. [Port.e.]

A study of the width and length/width ratio of fibres in soda pulps of *P. pinaster* of different ages. Fibre length increases with the age of the tree, but the corresponding increase in width is slight, so that different length/width ratios are obtained at different ages. In general the improvement in pulp quality with age does not compensate for the financial loss sustained by lengthening the felling cycle. Slabs from old trees, often wasted at the sawmill, make useful pulping material.

2592. FRISON, E. Le bambou et le problème papetier au Congo Belge. **[Bamboo and the problem of paper manufacture in the Belgian Congo.]** *Bull. agric. Congo belge* 42 (4), 1951 (965–86). [F.flem.]

Discusses (1) the suitability of *Bambusa vulgaris* and *Oxytenanthera abyssinica* for pulp manufacture, and (2) possible supplies of Bamboo and hardwoods for pulp manufacture in the Belgian Congo. [Cf. *For. Abstr.* 12 (No. 2169); 13 (No. 1692).]

2593. SINGH, C., and GUHA, S. R. D. **Pulping of *illuk* grass (*Imperata cylindrica*) by soda and mono-sulphite processes.** *Indian For.* 77 (10), 1951 (651–60).

Chemicals for mono-sulphite pulping cost 38% more than those for soda pulping. 'Fractional' digestion is more economical than 'overhead', for soda pulping of *I. cylindrica*.

2594. BHAT, R. V., and SINGH, M. M. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part IV. Writing and printing papers from *Helicteres isora* Linn. (*Maror Phal*).** *Indian For.* 77 (11), 1951 (664–75 + 3 sample sheets).

Admixture of chemical pulp from *H. isora* with long-fibred chemical pulps such as *sabai*-grass pulp gave writing papers with higher strength properties. The bark of *H. isora* has recently been found suitable as a substitute for jute in the preparation of gunny bags. The wood should therefore be available cheap. [Cf. *For. Abstr.* 13 (Nos. 1693–5).]

2595. THODE, E. F., and LEE, Y. H. **Ammonia-base sulphite pulping of hardwoods.** *Tappi* 33 (6), 1950 (257–60). 10 refs. P.R.

Describes an investigation on the sulphite pulping of a mixture of commercially chipped Birch, Beech, and Maple, using a 2-stage NH_3-base process. The process appears comparable with a single-stage Na-base sulphite cook.

2596. JENSEN, W. Björk ur teknisk och kemisk synpunkt. **[Birch from technical and chemical aspects.]** *Svensk PappTidn.* 54 (21), 1951 (739–45). 26 refs. [Sw.e.g.] P.R.

A review of literature on the chemistry of the outer and inner barks and of the wood, and on pulping. Legends to tables, graphs and photographs are in English.

2597. JENSEN, W. Björk som råmaterial för massaframställning. II Om kokningsbetingelsernas inverkan på utbyte och massakvalitet vid uppslutning enligt sulfatförfarandet. III Styrkeegenskaperna hos blandningar av björk- och tallsulfatmassor. **[Birch as raw material for pulp. II Influence of cooking conditions on yield and pulp quality in sulphate pulping. III The strength properties of mixtures of Birch and Pine sulphate pulps.]** *Pap. ja Puu* 33*B* (1; 11), 1951 (4–5; 333–5). [Sw.e.] P.R.

Cf. *For. Abstr.* 12 (No. 3184).

2598. HARVIN, R. L., HILLS, G. B. JR., ROTHROCK, C. W., JR., and NOLAN, W. J. **Pulping of Scrub Oak (*Quercus laevis*) by the kraft process.** *Tappi* 33 (7), 1950 (338–43). 3 refs. P.R.

2599. MELLER, A. **Eucalypt pulps from water prehydrolysis and sulphate pulping. The process and resultant pulp properties.** *Tappi* 33 (5), 1950 (248–53). 35 refs. P.R.

2600. MONTANO, J., and HOSSFELD, R. **The reaction of wood with alkaline solutions of sodium hydrosulphite.** *Tappi* 34 (10), 1951 (468–70). 20 refs. P.R.

The results of an investigation on the action of aqueous solutions of mixtures of NaOH and $Na_2S_2O_4$ on Aspen sawdust. The residual wood was unpulped, and its holocellulose content decreased (but the holocellulose recovery % increased) with the increase of $Na_2S_2O_4$ concentration. The yield of lignin from the black liquor decreased with the increase of $Na_2S_2O_4$ concentration. *From authors' summary.*

2601. BROWN, K. J., and MCGOVERN, J. N. **Production of high-yield pulps from Aspen by mild treatments with sodium hydroxide.** *Tappi* 33 (8), 1950 (364–8). 3 refs. P.R.

2602. Essais de fabrication de pâtes à papier à l'aide de bois d'emballage (peuplier): (procédés nitro-sodiques). **[Experimental pulping of Poplar wood from used crates by nitric-acid/soda processes.]** *Rapp. Fonds for. nat. Jan./Dec. 1950 Annexe XI* 1951 (6–8). [F.]

Report on experiments made at the Institut national du Bois, to determine the possibility of making use of the large quantity of waste wood (mainly Poplar) available in non-returnable open crates which usually include a certain quantity of metal fastenings. Two processes were tried, one hot and the other cold; in each case the chipped wood was treated first with HNO_3 and then with a soda solution. Results are tabulated. The pulps obtained were satisfactory, with breaking lengths up to 8,000 and good tearing strength. Refining tends to lower resistance, and should therefore be done in moderation.

2603. CHITTENDEN, A. E., COOMBER, H. E., and MORTON, D. ***Brachystegia* wood from Tanganyika as a paper-making material.** *Colon. Plant Anim. Prod.* 2 (1), 1951 (27–35).

Experimental soda pulping of two samples of *Brachystegia* logs [species unidentified] showed that the wood has a fairly satisfactory cellulose content but that the average length of the ultimate fibres places it in the category of short-fibred materials for paper-making purposes. Pulps were weak and yields only moderate. The papers furnished by the pulps were soft, bulky, and rather attractive in appearance. Both unbleached and bleached pulps showed a very poor response to beating. The very low α-cellulose and very high β-cellulose figures indicate that the wood would be quite unsuitable

for the manufacture of artificial silk. Full results are tabulated. [Cf. *For. Abstr.* 13 (No. 1704).]

2604. SEABRA, L. DE, and FERREIRINHA, M. P. Madeiras coloniais. [Colonial timbers.] *Estudos, Ensaios e Documentos, Ministério das Colónias, Lisboa* No. 6, 1950. pp. 52 + 21 plates. 11 refs. [Port.f.e.g.]

Contains (1) a brief exposition of the fundamentals of wood anatomy and (2) a study of the anatomy, chemical composition and suitability for pulping of *Ricinodendron rautanenii* and *Bombax rhodognaphalon*. Neither species is recommended for pulping.

2605. SANDERMANN, W. Studien über Harze, XV. Mitteilung: Über die Veredlung von Tallöl (Kiefernöl) durch Destillation. [**Studies on resins, XV. Improvement of tall oil (Pine oil) by distillation.**] *Holz Roh- u. Werkstoff* 9 (10), 1951 (378–82). 24 refs. [G.g.] P.R.

The results of fractional distillation of tall oil in a special apparatus show that it is possible to effect a considerable degree of separation into fatty acids and resin acids.

2606. WIKLUND, H. Bark som bränsle. [**Bark as fuel.**] *Pap. ja. Puu* 33*B* (11), 1951 (353–4). [Sw.e.] P.R.

The best bark presses leave a moisture content of 45–52%, giving the pressed bark a calorific value of 1,730 calories/kg.; with a moisture content of 30%, its calorific value would be 3,030 calories/kg. Figures are given showing the running costs of presses with and without drying apparatus, and the savings obtained from the greater calorific value of the dried bark. It is concluded that the cost of the drying apparatus would be offset by savings within a year, and that where wet bark is available in sufficient quantity and fuel consumption is large, it would be economic to instal a press with drying apparatus, at present, and even at rather lower, fuel prices.

2607. HÄGGLUND, E., and WEBJÖRN, B. **The hardness of wood pulps, parts 1–2.** *Transl. Commonw. sci. industr. Organ. Aust.* Nos. 1306, 1308, 1951. pp. 14 + 5 + 2 photos, 5 gphs. Transl. by M. Slade from *Svensk PappTidn.* 52 (6; 14), 1949 (131–7; 607–9). [Cf. *For. Abstr.* 11 (Nos. 472, 2998).] P.R.

Fibreboards

2608. RISI, J. La fabrication de panneaux à base de déchets de bois en Europe. [**The manufacture of fibreboards from wood-waste in Europe.**] *For. et Conserv.* 3 (8; 9; 10), 1951 (428–31; 474–7; 520–2). 6 refs. [F.]

Gives brief accounts of a number of processes—Novopan, Homogenholz, Durisol, Lignova, Harder, and Lignorite.

2609. **The manufacture of wallboard from wood waste.** *Mimeo. For. Prod. Lab., Can.* No. *O*–156, 1950. pp. 3. 9 refs. P.R.

Gives definitions of binder-boards and fibreboards and outlines the principles of their manufacture, as well as the requirements for a board plant based on wood waste.

2610. RENTELN, H. VON. Sågspån, ett användbart råmaterial för wallboard, kartong, papper m.m. [**Sawdust as raw material for wallboard, cardboard, paper, etc.**] *Svensk PappTidn.* 54 (19), 1951 (671–8). [Sw.e.g.] P.R.

In laboratory tests, sawdust was soaked in very weak (0·1 to 0·8%) NaOH at high temperatures, defibrated, beaten to different degrees of freeness, and pressed without the addition of adhesives. The alkali treatment is found to cause maximum swelling, and to make defibration possible without shortening the fibres. Results of strength tests and tests of water absorption of these boards and ordinary commercial boards are given in graphs and tables. The new boards compare favourably with commercial boards. Preliminary manufacture on a commercial scale has shown that the method is economically feasible.

2611. **How to utilize veneer waste.** *Wood, Chicago* 56 (12), 1951 (27). P.R.

Swain Industries, Inc., Seymour, Indiana, use daily 5–10 tons of dry veneer and panel trimmings for the manufacture of chair backs and seats. The waste is comminuted, mixed with resin, and pressed. Carbide-tipped knives and saws are desirable in the mass production of the back and seat panels.

2612. KISSER, J., KÖLI, G., and STEININGER, A. **Microscopic investigation of wood-fibre wallboards.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1358, 1951. pp. 20. 16 refs. Translated by M. Slade from *Mitt. öst. Ges. Holzforsch.* 2 (4), 1950 (11–8). [Cf. *For. Abstr.* 12 (No. 2173).] P.R.

2613. **Thermal conductivity of structural insulating board. Tappi tentative standard T 1,000 m-50.** *Tappi* 33 (7), 1950 (85*A*–88*A*). 4 refs. P.R.

863. *Wood Hydrolysis. Saccharification*

See also No. 2429.

2614. SAVARD, J., and ESPIL, L. Hydrolyse par percolation sulfurique de quelques bois tropicaux. [**Hydrolysis of some tropical woods with H_2SO_4.**] *Publ. Centre tech. for. trop.* No. 2, 1951. pp. 118. 9 refs. [F.f.e.g.]

The following species were examined: *Poga oleosa, Cleistopholis patens, Arachis hypogea* (shells), *Mitragyna ciliata, Sarcocephalus diderrichii, Erythrophleum guineense, Sterculia tragacantha, Daniella klainei, Calpocalyx* sp., *Distemonanthus benthamianus, Pachypodanthium staudtii, Fagara heitzii, Dacryodes buettneri*. The yields of total reducing substances, and those of sugars capable of undergoing alcoholic fermentation, were determined for these species, using Scholler's method and the Fouque technique. The average yield of reducing substances amounts to 45–50% of kiln-dry total wood, i.e. 20% less than that obtained with hydrolysed European woods. The Fouque technique can give satisfactory yields with tropical woods if the hydrolysate contains at the most 8–14 g. reducing substances per litre. A higher concentration can only be achieved at the cost of a lower yield. In this respect the species examined are inferior to *Pinus pinaster*. The hydrolysates of tropical species usually ferment in very diluted solutions, but in

some species fermentation is inhibited by toxic substances when the concentration reaches an economically profitable level. It is therefore important that the question of preliminary purification should be further investigated.

2615. SAVARD, J., and ESPIL, L. Fermentation alcoolique des jus d'hydrolyse de quelques bois tropicaux. **[The alcoholic fermentation of the hydrolysates of some tropical woods.]** *Publ. Centre tech. for. trop.* No. 3, 1951. pp. 69. 94 refs. [F.f.e.g.]

[Cf. preceding abstract.] The fermentability of the same tropical species has been examined. Hydrolysate toxicity was evaluated by Pasteur's coefficient and a fermentation coefficient (the ratio of sugars transformed to the total original sugars). The highly diluted (less than 14 g./litre) saps are not toxic; more concentrated saps (25–30 g./litre) often are so.

866. *Utilization of Wood Extractives*

See also Nos. 2449, 2708.

2616. **Utilization Circle research notes: Cutch boiling.** *Burmese For.* 1 (1), 1951 (23–4). [E.]

Experiments were made on different methods of smoking the iron pans in which tannin extract (cutch) is obtained from *Acacia catechu* wood, in order to insulate the extract from the iron, which turns it black. The use of aluminium pans avoids this trouble.

2617. BHATNAGAR, M. S., and NIGAM, P. C. **Organic adsorbents from Indian plants. I. Preparation, activation and relative adsorptive power.** *J. appl. Chem.* 1 (11), 1951 (517–20). 5 refs. P.R.

It has been found that products obtained by sulphonation of katha and cutch [water-soluble extracts from *Acacia catechu*] and subsequent condensation with CH_2O, have a considerable adsorptive power.

2618. BHATNAGAR, M. S., and NIGAM, P. C. **Organic adsorbents from Indian tannins. II. Adsorption of acids, bases and salts.** *J. appl. Chem.* 1 (11), 1951 (520–2). 7 refs. P.R.

2619. BERNARDINI, F. Direttive per la determinazione dei quantitativi massimi di legname di castagno da destinarsi all'industria degli estratti tannici. **[Rules for determining the maximum quantities of Chestnut wood to be allocated to the tanning industry.]** *Monti e Boschi* 1951 (8/9), (357–67). [It.f.e.]

Describes the procedure followed in the province of Parma. Data available for the years 1931–51 show that it is possible to supply the trade and at the same time improve the condition of the Chestnut woods.

867. *Destructive Distillation*

See also No. 2628.

2620. JOHNSON, B. L. C. **The charcoal iron industry [in England and Wales] in the early eighteenth century.** *Geogr. J.* 117 (2), 1951 (167–77). 9 refs. O.G.

2621. LOURMPOPOULOS, G. D. Ereuna epi tōn xylanthrakōn tōn en Helladi dasikōn eidōn. **[Research on charcoal burning of Greek forest species.]** *Dasos* No. 5, 1948 (5–13). [Gk.]

A general account of the industry, with some data on recent outturn and the physical properties (sp. gr., water absorption, heating power) of the main Greek species used. These include (of 14 spp. listed) *Quercus coccifera, Q. ilex, Arbutus unedo, Pistacia lentiscus, Erica arborea, Olea europaea* and *Pinus halepensis.* Production exceeded 76 million okes [1 oke = 2·8 lb.] in 1940 and dropped to 39 million in 1947.

89. OTHER ('MINOR') FOREST PRODUCTS

892. *Vegetable Products*

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 1984, 2179–81, 2432, 2606.

2622. PISAPIA, N. DE. Sul contenuto di sostanze concianti della corteccia di abete rosso italiano. **[The tannin content of Italian Spruce bark.]** *Bollettino ufficiale della Stazione sperimentale per l'Industria delle Pelli e delle Materie concianti, Napoli* 27 (1), 1951 (31–7). [It.it.] L.S.

Extracts were made from bark of a number of *Picea abies* trees of different ages, growing at different altitudes. The ratio of tannins to non-tannins in the extractives appeared to reach a maximum between the ages of 60 and 100 years and to decline thereafter. There was no clear correlation between tannin content and altitude.

2623. HAGLUND, A. Beiträge zur Kenntnis des Fichtenrindengerbstoffes. I. Zerlegung eines Fichtenrindenextraktes in 2 Fraktionen durch partielle Gerbstoffällung mit Aethylalkohol. **[Spruce-bark tannin. I. Separation of Spruce-bark extract into 2 fractions by partial tannin precipitation with ethyl alcohol.]** *Leder, Darmstadt* 2 (7), 1951 (145–50). 7 refs. [G.] [A. B. Tannin, Västervik, Sweden.] L.S.

It has been found that the poor tanning qualities of the Spruce bark extract obtained by mild sulphiting are due to the fraction precipitable by ethyl alcohol. Hence the extract could be improved by reducing or completely removing this fraction.

2624. PLANHOL, X. DE. Le chêne à vallonnée. **[*Quercus aegilops.*]** *Ann. Géogr.* 59 (314), 1950 (126–9). [F.] O.G.

A short account of the ecology of the species, with a more detailed description of the trade in vallonia.

2625. E., R. S. DE. España es el segundo país productor de corcho. **[Spain is the second cork-producing country.]** *Montes, Madrid* 7 (40), 1951 (308–11). [Span.]

Includes statistics showing (among production figures) the area occupied by Cork Oak stands in the various Spanish provinces.

2626. NARAYANAMURTI, D., and DAS, N. R. **A preliminary note on adhesives, building boards, and moulding powders from tree barks.** *Indian For.* 77 (11), 1951 (706–8). 6 refs. [Forest Research Institute, Dehra Dun.]

Experiments in the utilization of bark indicate that bark of several species with a high tannin content (e.g. *Shorea robusta*, *Acacia catechu*, *Terminalia chebula*) with the addition of small quantities of paraformaldehyde or furfural will make satisfactory moulding powders, and that bark extracts from *Acacia catechu* and *A. decurrens* var. *mollissima* provide the basis for satisfactory plywood adhesives. [Cf. *For. Abstr.* 12 (No. 1343).]

2627. KURTH, E. F., and KIEFER, H. J. **Wax from Douglas-Fir bark.** *Tappi* 33 (4), 1950 (183–6). 7 refs. P.R.

Presents data on the optimum conditions for the extraction of Douglas Fir bark, and the chemical composition, properties, and yield of the wax which is the major constituent of the extractives from this bark. The wax soluble in C_6H_6 and in chlorinated aliphatic hydrocarbon-type solvents makes up 5–10% of the weight of the dry bark. [Cf. *For. Abstr.* 12 (No. 1457).]

2628. KURTH, E. F., and RATNAM, C. V. S. **Products obtained by destructive distillation of Douglas-Fir bark.** *Tappi* 33 (10), 1950 (517–9). 13 refs. P.R.

Presents the results of several distillation runs at temperatures of 745–910° C., the distillation times varying from 2 to 10 hours. Yield determinations and analyses of various products have been carried out. The yield of charcoal is much higher than that reported in previous work done on waste wood and sawdust of Douglas Fir and other woods.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

See also No. 2178.

2629. **A note on the plants of medicinal value found in Pakistan.** Pakistan Forest Research Institute. 1951. pp. 25. Obtainable from Manager of Publications, Karachi. Price *As.*14.

2630. SILLANS, R. Sur quelques plantes médicinales de l'Afrique centrale. [**Some medicinal plants of central Africa.**] *Rev. int. Bot. appl. Agric. trop.* 31 (345/346), 1951 (407–27). 97 refs. [F.] P.R.

Lists the plants, including a large number of trees, by their medicinal properties, giving notes on their preparation and application.

2631. RAYMOND-HAMET. Sur une drogue remarquable de l'Afrique tropicale, le '*Picralima nitida*' (Stapf.) Th. et H. Durand. [**A remarkable drug from tropical Africa, [that obtained from] *Picralima nitida*.**] *Rev. int. Bot. appl. Agric. trop.* 31 (347/348), 1951 (465–85). 72 refs. [F.] P.R.

Discusses the identification and distribution of *P. nitida*, and the uses and chemical composition of its seeds.

2632. BALANSARD, J., and BERNARD, P. **Hederine and saponosides of the leaves of Ivy, *Hedera helix*.** *Médecine Tropicale, Marseilles* 9, 1949 (593–6). *Chem. Abstr.* 45 (6), 1951 (2633*a*). P.R.

2633. MENJŠIKOV, G. P., GUREVIČ, E. L., and SAMSONOVA, G. A. **Alkaloids of *Elaeagnus angustifolia*. Structure of eleagnine.** *Žurnal Obščeĭ Himii, Moskva* 20, 1950 (1927–8). *Chem. Abstr.* 45 (6), 1951 (2490*d*). P.R.

2634. DENOËL, A. Le *Strychnos icaja* Bn. du Congo Belge. [*S. icaja* **from the Belgian Congo.**] *Journal de Pharmacie de Belgique, Bruxelles* 5 (3/4), 1950 (59–77). [F.flem.] L.S.

Presents the results of an exhaustive chemical investigation.

2635. AIHARA, T. **Principle of *Zanthoxylum piperitum*. II. The isolation of sanshoöls and the structure of sanshoöl—I. III. The structure of sanshoöl—II.** *Journal of the Pharmaceutical Society of Japan, Tokyo* 70, 1950 (405–11). *Chem. Abstr.* 45 (6), 1951 (2400*i*, 2401*d*). P.R.

2636. ABDULLAEVA, A. A. Antibiotičeskie svoĭstva plodov gledicii. [**Antibiotic properties of *Gleditsia* fruits.**] *Priroda, Moskva* 40 (9), 1951 (52–3). [Russ.] A.P.B.

During a study of plants growing in the Tashkent oasis as possible sources of antibiotics, it was found that both the juice of and volatile substances present in fruits of *G. triacanthos*, *G. inermis*, and *G. japonica*, were highly active against a number of pathogenic and saprophytic bacteria, as well as some other micro-organisms. The substances concerned were thermo-stable, and the fruits retained their activity for a long time. The degree of effectiveness against some of the micro-organisms is indicated briefly and in general terms, and the need for further research on their value for medicinal purposes and in food preservation, is urged.

2637. MOROE, T., and HARA, S. **Constituents of Hinoki (*Chamaecyparis obtusa*) leaf oil.** *Journal of the Pharmaceutical Society of Japan, Tokyo* 71 (6), 1951 (503–6). 8 refs. [Jap.e.] L.S.

A new component, *d*-terpinyl acetate, has been found besides the known components (pinene, limonene, bornyl acetate, sesquiterpene, and sesquiterpene alcohol). The acid portion of the oil contains hinokic acid, m.p. 166° C., the formula of which is $C_{15}H_{22}O_2$ rather than $C_{15}H_{24}O_2$. It has been observed that this acid is effective in inhibiting the growth of *Mycobacterium tuberculosis* (avian type) *in vitro*, at about 1 : 10,000 dilution. *From authors' summary.*

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap. Sugar

See also Nos. 1894, 2448–9, 2637.

2638. SAIKIA, B., DAS, P. K., and ROY, B. K. D. **Turpentine oil and rosin from *Pinus khasya* (Khasi Pine, Diengkseh or Saral).** *Curr. Sci.* 20 (10), 1951 (275–6). A.P.B.

Presents the results of a study to explore the industrial possibilities of oleo-resin from *Pinus khasya*. So far, yield per tree (diameter 12–18 in.) in the Khasi and Jaintra Hills is about 5–6 lb. per tapping season. Tables show yield of turpentine and rosin from 100 g. resin, and the physical and chemical properties of the turpentine and rosin.

2639. LÉONARD, J., and HEBBELYNCK, M.-F. Sur deux espèces résinifères congolaises. [**Two**

resin-bearing species from the Congo.] *Bulletin des Seánces, Institut Royal Colonial Belge, Bruxelles* 21 (2), 1950 (420–6). [F.] L.S.

Notes on *Tessmannia anomala* and *Cleistanthus caudatus*. A chemical investigation of the exudate of *C. caudatus* indicates that it is a resin but not a true copal.

2640. MANALO, G. D., and WEST, A. P. **Analysis and composition of Manila elemi.** *Philippine Journal of Science, Manila* 78 (1), 1949 (111–20). 9 refs. L.S.

Manila elemi, the resin that oozes from cuts in the bark of the Pili tree (*Canarium luzonicum*), is used in making paints, varnishes and lacquers, and also in the manufacture of plastics and printing inks. Results of a chemical analysis of the resin are presented.

2641. FULLER, H. J. **War-time rubber exploitation in tropical America.** *Econ. Bot.* 5 (4), 1951 (311–37).

A brief history of the exploitation of tropical America's rubber resources during the second world war, with an account of the tapping and processing methods used. Almost every rubber-producing species in tropical America was exploited or tested, but *Hevea brasiliensis* furnished the greatest proportion of all the natural rubber produced, mainly from wild trees in the upper Amazon basin, though plantations established chiefly before 1920 in parts of Brazil, British Guiana, Trinidad and some Central American countries, were also brought into production. Of the other species exploited, the most important was *Castilloa elastica* (found in south-eastern Mexico, Central America and northwestern South America), both plantation-grown and wild. Tapping of *Sapium jenmani* was attempted in British Guiana, but as yields were low and tapping difficult (the trees being scattered, and the latex very viscous) attempts were soon abandoned. Greater success with *S. jenmani* was obtained in Venezuela and Colombia, but production was not large. Similar difficulties were encountered with *Micandra* sp. in the Orinoco basin.

892.7. Fruits, Seeds. Fibres, Yarns and Flosses

See also Nos. 1850, 1918, 2182, 2265.

2642. TURNER, A. J. **Bast and leaf fibres—development and prospects.** *J. Text. Inst., Manchr.* 42 (8), 1951 (*P*325–38). D.S.I.R.

An economic survey of the production and trade in the bast-fibre industry since the 18th century, with a summary of the present position and prospects for the future.

2643. DUBOIS, L. Note sur les principales plantes à fibres indigènes utilisées au Congo Belge et au Ruanda-Urundi. **[Notes on the principal indigenous fibre plants used in the Belgian Congo and Ruanda-Urundi.]** *Bull. agric. Congo belge* 42 (4), 1951 (870–90). 15 refs. [F.flem.]

892.8. Heather. Broom etc. Osiers. Canes and Bamboos

See Nos. 2423, 2592.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

See also Nos. 2368–9.

902. *History of Forests and Forestry*

See also No. 2651.

2644. GUINIER, P. L'évolution scientifique de la foresterie. **[The scientific development of forestry.]** *Bull. Soc. for. Belg.* 58 (11), 1951 (441–68). [F.]

Describes the historical development of scientific techniques in forestry.

2645. STEVEN, H. M. **The forests and forestry of Scotland.** *Scot. geogr. Mag.* 67 (2), 1951 (110–23). 48 refs. O.G.

An historical account.

2646. OIKONOMOPOULOS, A. Hē sēmerinē thesis tēs ethnikēs dasoponias. **[The present situation of [Greek] national forestry.]** *Dasos* No. 4, 1947 (11–21). [Gk.]

Includes a sketch of the vicissitudes of forest conservation in Greece, from the beginnings of the Forest Department at Vytina (1898) and the establishment of a Forestry School at Salonika (1917) to the first attempts thereafter at afforestation (chiefly in or round towns) and the framing of working plans. Natural regeneration was greatly facilitated by the exclusion of goats from managed forest in 1936, forest communications were greatly improved and sawmilling started on a small scale. [Cf. *For. Abstr.* 13 (No. 2669).]

903. *Forest Policy, General*

See also Nos. 2369, 2669.

2647. **Report of committee on forest policy.** *Council Paper Legislative Council, Fiji* No. 3, 1950. pp. 16.

Cf. *For. Abstr.* 12 (No. 3544).

2648. LIHTONEN, V. Syrjäiset metsät taloutemme tukena. **[The exploitation of remote forest areas in Finland.]** *Metsät. Aikak.* 1951 (4), (99–103). [Fi.e.]

The possibility of exploiting the less accessible forests, covering an estimated area of 5 million ha., and having an estimated volume of 230 million cu.m., to counterbalance the loss of forests to Russia, is discussed. Further research and provision of capital will be necessary but this appears to be the only possible way of maintaining the present volume of production. *From author's summary.* [Cf. *For. Abstr.* 13 (No. 1994).]

904. *General Regional Accounts of Forests and Forestry*

See also No. 1829, 2680–2.

2649. GIBSON, W. N. **Forestry in Northern Ireland.** *Forestry* 24 (2), 1951 (152–8).

The progress made in forestry under the Ministry of Agriculture since 1921 is discussed, and conditions compared with other parts of the U.K. Climatic and soil conditions are considered and notes given on the principal species used and their suitability for the sites available. In addition drainage, planting methods, management, and utilization of small produce, are all lightly touched on and figures given for the areas acquired and the acreages planted to date. *Author's summary.*

2650. **Twelfth general report of the Ministry of Agriculture.** H.M. Stationery Office, Belfast. 1951. pp. 152. Price 4*s.* 6*d.*

The report covers the period 1934–50, and the section on forestry (pp. 102–9) deals particularly with acquisition of land for planting, nursery facilities, planting programme, timber control, labour supply and housing, training and education, and private planting.

2651. BJARNASON, H. Stutt yfirlit um 45 ára Skógræktarstarf á Íslandi. **[A short review of 45 years of forestry in Iceland.]** *Ársr. Skógræktarf. Íslands 1946* (53–77). [Ice.]

Discusses the planting of exotics, fencing forest land against cattle, direct sowing, the establishment of nurseries, the purchase of forest land by the State, and the work of the forestry societies. [Cf. *For. Abstr.* 13 (Nos. 2028–30, 2046, 2668).]

2652. CHATURVEDI, M. D. **Tour note on the forests of Assam.** Government of India Press, New Delhi. 1951. pp. 26 + 4 photos.

The following is a summary of the recommendations of the Inspector General of Forests to the Government of India as a result of a tour of Assam made in May 1951. Attempts should be made to provide a well planned permanent agricultural economy for the aboriginal tribes, to wean them from the practice of shifting cultivation. Forest management should be adjusted to the need of developing industries based on processed forest products (e.g. paper, veneers, wattle, quinine, matches etc.) which impose the minimum strain on the limited communications of the region. Modifications in the planting technique of *Cinchona* are suggested, and an appendix deals with the spacing of *Cinchona* plantations. The raising, rather than the opening of the upper canopy is indicated for inducing natural regeneration in the Sal (*Shorea robusta*) and other hardwood areas. The practice of obtaining artificial regeneration of *Pinus khasya* with the help of potato cultivation is recommended [cf. *For. Abstr.* 13 (No. 2045)]. Recommendations are also made for the reorganization of the Forest Department.

2653. CHOUDHURY, K. C. R. **Sikkim—the country and its forests.** *Indian For.* 77 (11), 1951 (676–83 + 8 photos, 1 map). 5 refs.

2654. KAPADIA, G. A. **Forest wealth of Gir and Girnar in Junagadh district of Saurashtra.** *Indian For.* 77 (12), 1951 (771–4).

2655. HAN, U THEIN. **Forestry in the Union of Burma.** *Burmese For.* 1 (1), 1951 (5–7). [E.]

2656. SHIRLEY, J. C. **Oklahoma forests and woodlands.** *Proc. Okla. Acad. Sci.* 30, 1949 (3–10). 6 refs. A.P.B.

2657. KERNAN, H. S. **Forestry in Bolivia.** *Unasylva* 5 (2), 1951 (59–63).

2658. BECKING, J. H. De instandhouding van de houtproductie in Suriname. **[Maintenance of timber production in Surinam.]** *Landbouwk. Tijdschr., Wageningen* 63 (7), 1951 (438–46). [Du.e.] A.P.B.

Describes briefly the extent and composition of the forests, and outlines suggestions for a thorough land and air survey, for forest research to be carried out in Holland, for improved organization of felling, including the provision of a system of roads, for education, greater integration of forest industries, and improving the forest composition by artificial regeneration and the introduction of exotics.

2659. SCHUTTEMAKER, J. P. Bos en bosbeheer op Java. **[Forests and forest administration in Java.]** J. B. Wolters, Groningen and Djakarta. 1950. pp. 87. [Du.] (*Insulinde, Serie Handleidingen voor de Kennis van Indonesië* No. 7.) Price *Fl.*3·00.

Gives a brief survey of: climate, soil, and forest types; the forest area; management; forest products and utilization; and the development and organization of the Forest Service.

905. *Forest Statistics and Resources*

See also No. 2375.

2660. **Report of the European Commission on Forestry and Forest Products, Fourth Session 1–6 October 1951, Rome.** FAO, Rome. 1951. pp. 15. (*FAO/EFC*/39.)

The Commission considered the reports on national forest policies received from member governments, who, it was agreed, should be asked to report annually. The main topic discussed was the relation between annual fellings, allowable cut (*possibilité*) and increment, and reports for 1952 should have answers to the following questions: What is the most recent estimate of annual increment? Is there a national figure of allowable cut, what is it, and to what period does it relate? What is the annual cutting plan for 1947–51, and for subsequent years, if a plan has been laid down? How are the above figures arrived at? What are the reasons for any differences between these figures and those for annual increment? What powers are there to enforce the cutting plan? What were the average annual fellings for the period 1945–51? If the figure for average annual fellings is higher or lower than that for allowable cut, state reasons.

2661. **European Commission on Forestry and Forest Products, Fourth Session, 1–6 October 1951, Rome. Report of the working party on afforestation and reforestation.** FAO, Rome. 1951. pp. 5 + 3 pp. of tbls. (*FAO/EFC*/36 Rev. 1.)

Tabulated data on areas afforested or reforested and scheduled for afforestation or reforestation are given for all member countries.

2662. Tall fra fem land. **[Figures from five countries.]** *Norsk Skogind.* 5 (8), 1951 (227–31, 258). [Nor.] P.R.

Production figures for pulp and paper, and for softwood resources, in the U.S.A., Canada, Sweden, Finland and Norway.

2663. Annuario dell'agricoltura italiana. Vol. III: 1949. **[Yearbook of Italian agriculture. Vol. 3: 1949.]** Istituto nazionale di Economia agraria, Rome. 1950. pp. xvi + 561. [It.f.e.] M.A.F.

The chapter on forest production (pp. 101–20), includes tables for 1948–9 (with English as well as Italian captions) as follows: (24) area of forests by geographical region, topography (mountain, hill or plain), type of management (high forest, coppice with standards, coppice), composition (coniferous, broadleaved, mixed); (25) forest products, by assortments and geographical divisions; (26) production of wood by species and assortments; (27) ditto by regions and assortments; (28) production of fuelwood; (29) production of charcoal; (30) other forest products (cork, chestnuts, acorns, pine-kernels). Appendixes give forest areas ceded to France, Jugoslavia and Trieste by the peace treaty, and current stumpage prices.

2664. Metsätilasto: kertomus metsähallinon toiminnasta vv 1944–48. **[Forest statistics: report on forest administration activities, 1944–8.]** *Suomen Virallinen Tilasto* (*Ser. XVII*) No. 39, 1950. pp. 105. [Fi.Sw.f.]

2665. Domänverket år 1949 av Kungl. Domänstyrelsen. **[Work in the State Forests, 1948, by the Royal State Forestry Board.]** *Sveriges Officiella Statistik: Skogshushållning.* Kungl. Boktryckeriet. P. A. Norstedt & Söner. 1950. pp. 116. [Sw.]

2666. Det enskilda skogsbruket år 1949 av Kungl. Skogsstyrelsen. **[Private forestry [in Sweden] in 1947, by the Royal Forestry Board.]** *Sveriges Officiella Statistik.* Centraltryckeriet Esselte AB, Stockholm. 1951. pp. 106. [Sw.]

2667. ARMAN, V. Några preliminära resultat från riksskogstaxeringen av Jönköpings, Kronobergs och Kalmar län. **[Some preliminary results of the national forest survey for Jönköping, Kronoberg and Kalmar counties.]** *Svenska SkogsvFören. Tidskr.* 48 (4), 1950 (345–90). [Sw.]

2668. STEFÁNSSON, V. Nokkrar staðreyndir um skógræktina. **[Some facts about forestry.]** *Ársr. Skógræktarf. Íslands 1950*, 1951 (5–23). [Ice.]

The climate and soil of Iceland are discussed, and data given on the growth of *Pinus mugo, P. cembra, P. sylvestris, Picea engelmanni, P. sitchensis* and *Larix sibirica* [cf. *For. Abstr.* 13 (No. 2029)]. The present annual import of timber averages 80,000 cu.m., at a cost of Kr. 50–60 million. Of this, softwood, which could be grown in Iceland, accounts for 70,000 cu.m. The average annual increment is 2·5 cu.m./ha., and it is estimated that for Iceland to become self-supporting in timber by the year 2050, 50,000 ha. of land must be afforested, the land available and suitable for afforestation being ca. 100,000 ha. To plant up the area required, at 500 ha. yearly during the 6-weeks planting season in spring and early summer, volunteer labour would be needed; also 3 million plants at an estimated cost of Kr.1·5 million. **[Cf. *For. Abstr.* 13 (No. 2651).]**

2669. THALASSINOS, D. Hyperkarpōsis. [**Over-exploitation.**] *Dasos* No. 5, 1948 (18–25). [Gk.]

Discusses in general terms the causes and cure of deforestation in Greece and estimates the average annual drain in cu.m. as follows:—timber 130,000; fuel (for charcoal) 500,000; (for lime kilns) 150,000, (rest) 370,000, total 1,150,000. To this must be added the enormous figure of 3,800,000 cu.m. stolen by the local inhabitants, making a grand total of nearly 5 million cu.m. wood p.a. By contrast, the total annual increment has been estimated at 3,900,000 cu.m. and the forest area destroyed annually, by fire, browsing, illicit fellings etc. at 200,000 stremmas [1 stremma = 1,000 sq. m.].

New forest laws have assisted forest protection in the past 25 years, but under recent conditions the situation has worsened. Amongst remedies suggested by the author are: use of other fuels instead of firewood; control of goat browsing; state control of all forests; a great increase in the number of forest guards, which at present totals 350 for the whole country. [Cf. *For. Abstr.* 13 (No. 2646).]

2670. NOVAK, V. Gozdovi LRS po drevesnih vrstah. [**The forests of the Slovenian People's Republic according to tree species.**] *Gozd. Vestn.* 9 (3), 1951 (60–7). [Sloven.croat.e.]

A posthumous paper. In 1946–7, a total enumeration of Slovenian forests was done by species, based on stems over 7 cm. thick [d.b.h.?]. Conifers form 53·2 and hardwoods 46·8% of the total crop. The % of stems 7–20 cm. thick is 30 for conifers and 40 for hardwoods, of stems 21–40 cm., 53 and 48% and over 40 cm., 17 and 12%. Among conifers Spruce preponderates by volume (46·1%), then Fir (36·4%), and Pine (15·6%). Among hardwoods, Beech forms 72% of the total, followed by Oak (all species ca. 15·7%), 'gaber' [*Carpinus orientalis*?] 5%, and Chestnut 2%.

2671. ISHAQ, S. M. **A note on the timber resources of Pakistan.** Pakistan Ministry of Food & Agriculture (Agriculture Division), Karachi [*n.d.*] pp. 16. [E.] P.R.

Contains tables showing the scientific and local names, annual output (timber, firewood, and total), occurrence, density (air-dry), and principal uses of indigenous commercial timbers of Pakistan (3 species in Baluchistan, 51 in East Bengal, 9 in North-West Frontier Province, 5 in Sind, and 10 in the Punjab). The total forest area of Pakistan is 13,665 sq. miles, equivalent to 6% of its total area (8,618 sq. miles in, and 16·7% of, East Bengal). The total annual production of wood is ca. 40 million cu. ft. solid volume. Per head of population, the forest area is ca. 0·11 acre, and the annual consumption of wood ca. 0·5 cu. ft., against a minimum need of about 20 cu. ft. The leading softwood species is *Pinus longifolia*, the leading hardwood *Dalbergia sissoo*.

2672. **Forest statistics of Southern Indiana.** *For. Surv. Release Cent. St. For. Exp. Sta.* No. 10, 1951. pp. 40 + 1 map.

Tabulates data for 1950 showing the forest and non-forest areas by county; commercial forest area by ownership class and by forest type and stand size class; sawtimber volume; total cubic volume of sound wood; and of primary growing stock; and average volume per acre; for the Lower Wabash, knobs (south-central) and upland flats (south-eastern) areas of S. Indiana.

906. *Direct Economic Significance of Forests*

2673. GILMOUR, J. D. **The forest situation in the province of Quebec.** University of British Columbia. 1951. pp. 14. The H. R. MacMillan Lecture in Forestry.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 1825 *et seq.*

2674. **Les problèmes des sols tropicaux dans l'Union français. 1. L'Afrique continentale. 2. Madagascar, Comores, Ets. français d'Océanie, Nouvelle Calédonie, Côte française des Somalis, Départements français d'Outre-mer: Guadeloupe, Martinique, Réunion, Guyane. 3. Pays associés de l'Indochine. [Problems of land use in tropical regions of the French Union. 1. Continental Africa. 2. Madagascar, Oceania, French West Indies etc. 3. Countries of Indochina.]** Direction de l'Agriculture, de l'Élevage et des Forêts du Ministère de la France d'Outre-Mer, Paris. 1950. pp. 87 + 67 + 59 + 5 maps. [F.] Price [£2. 4*s*.]

2675. WYATT-SMITH, J. **Forestry, agricultural settlements and land planning [in Malaya].** *Malay. Forester* 14 (4), 1951 (206–12 + 6 photos).

2676. WALTON, A. B. **Land planning and forestry [in Malaya].** *Malay. Forester* 14 (4), 1951 (212–20).

2677. PRAX, J. Le rétablissement de l'équilibre agro-sylvo-pastoral et la mise en valeur forestière du bassin supérieur de l'Agout. [**The restoration of a balance between agriculture, forestry and animal husbandry, and the reforestation of the upper basin of the Agout.**] *Ann. Éc. Eaux For. Nancy* 12 (2), 1951 (471–523 + 8 photos, 3 maps). 24 refs. [F.g.e.]

A general discussion of the problems in this area of the Cevennes is illustrated by a detailed account of the reorganization effected on an estate of 363 ha. purchased by the state. The essence of the plan is improvement of permanent pasture and afforestation of wastes combined with the folding of sheep. Reforestation carried out since 1860 is reviewed. The author conceives that the ultimate aim should be to establish a Beech/Fir forest, which appears to be the natural climax in this region. In addition to *Abies alba*, which is indigenous, he recommends the use of *A. nordmanniana* and possibly *A. grandis*.

2678. **Stortinget og skogreisningen i kystfylkene. [Parliament and the afforestation of the coastal districts.]** *Tidsskr. Skogbr.* 59 (1/2), 1951 (1–4). [Nor.]

A report of discussion in the Norwegian parliament on the proposal to plant 7·7 million dekares on the west coast within 80 years, an annual average of 48 million plants at a cost of Kr.6·3 million. The proposed state contribution is a yearly average of Kr.3·3 million.

2679. SØRHUUS, K. **Om belåning av skogkulturfelter spesielt under skogreisning på Vestlandet og i**

kystdistriktene. **[The provision of credits for planting, especially for afforestation in W. Norway and in the coastal districts.]** *Tidsskr. Skogbr.* 57 (4), 1951 (105–12). [Nor.]

Proposes a form of loan by which the creditor would be responsible for planting and for administration of the area planted for 30 years, and would recover the money invested and the interest due only after 30 years, when thinning began. Examples are given, calculating, from the expectation value and estimated costs, the security afforded to the creditor by planting on different site classes.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

922. *Publicly Owned Forests*

See also No. 2665.

2680. **Britain's forests: Loch Ard.** Forestry Commission, London. 1951. pp. 20. Price 1*s.*

2681. **Forestry Commission Guide: New Forest.** Forestry Commission, London. 1951. pp. 86 + map in pocket. Price 2*s.* 6*d.*

2682. **Britain's forests: Cannock Chase.** H.M. Forestry Commission, London. 1951. pp. 16. Price 9*d.*

923. *Privately Owned Forests*

See No. 2666.

928. *Consolidation of Scattered Holdings*

2683. STEINER, W. Organisatorisches bei Waldzusammenlegungen im Kanton Zürich. **[Organizing the consolidation of scattered forest holdings in the canton of Zürich.]** *Schweiz. Z. Forstw.* 102 (10), 1951 (491–501). [G.f.]

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also Nos. 1826–7, 1831.

2684. WEYMUTH, H. Die Zusammenarbeit des höheren Forstpersonals mit den Gemeindebehörden. **[The co-operation of senior forestry staff with local [communal] authorities.]** *Schweiz. Z. Forstw.* 102 (12), 1951 (617–34). [G.f.]

2685. **Forestry Act, 1951.** H.M. Stationery Office, London. 1951. pp. 23.

2686. GOSLING, A. H. **Control of felling: The Forestry Act, 1951.** *Sylva, Edinb.* No. 32, 1951 (5–6).

A short exposition of the principal provisions of the Act.

2687. **[Dedication scheme for private landowners in Buganda.]** *Rep. For. Dep. Uganda 1950*, 1951 (9–10).

This scheme, which began to function in 1950, is essentially one of management on behalf of landowners by the Buganda Government of portions of private land voluntarily offered for forestry purposes. The period of management depends upon the crop to be raised, but it must be long enough to allow Government to recover its outlay from forest revenue. Profits from management are given to the landowners. In order to ensure the return of expenditure on planting such slow growing species as Mahogany and Muvule, the period of the lease is fixed at 99 years. Provision is made for a dedication grant to the landowner at the outset, and for later payments of profits from the working of the forests. But, to ensure that revenue from any initial standing crop is used for regeneration, no payment of profits can be made until the area has been certified by the Conservator as being properly regenerated. Then, there would be a division of profits—75% going to the landowner and 25% being retained by Government to be used in tending operations. The next payment would take place when the Conservator was satisfied that further tending was unnecessary, any net profits being again divided as before. After this, the Buganda Government would cancel the lease at any time, once its capital outlay had been recovered, but would require the landowner to manage the forest in accordance with a proper working plan. On such an undertaking being given, all residual profits would be paid to the landowner.

2688. HOLAND, P. Det norske system med avgifter på salgsvirke til skogkulturarbeider og andre investeringer på skogen. **[The Norwegian system of levies on timber sales, to be used for reforestation and other forest investments.]** *Svenska SkogsvFören. Tidskr.* 49 (1), 1951 (3–13). [Nor.]

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

941. *State Subsidies etc.*

See Nos. 2028, 2231, 2362, 2678.

942. *Credits*

See No. 2679.

943. *Forest Insurance*

See Nos. 2245, 2704.

944. *Co-operation. Collaboration of Forest Owners*

See also No. 2704.

2689. URQUHART, B. **Forest management in Scotland.** *Times Survey of British Agriculture, London* Dec., 1951 (12–3).

An account of the formation, membership and activities of the Scottish Co-operative Forestry Society.

945.1. *Advisory and Information Services. Documentation Centres*

2690. **Final report of the joint FAO/IUFRO Committee on Forest Bibliography.** FAO, Rome. 1950. pp. 4 + 4.

Reports to FAO and IUFRO on the finally approved Oxford decimal classification and makes recommendations for improved bibliographical services; also makes recommendations on national title lists and authors' summaries in publications.

2691. AMÉEN-MALMSTRÖM, H. Skoglig dokumentation. [Documentation in forestry.] *Tidskrift för Dokumentation, Stockholm* 7 (3), 1951 (25–8). [Sw.] A.S.L.I.B.

Discusses briefly the development of decimal classification for forestry subjects, and lists and appraises some bibliographies and abstract journals of forestry interest published in Europe and N. America.

2692. **The organisation of ledger filing.** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (94–106).

Four papers and summary of debate.

945.3. *Education. Training*

See also No. 2454.

2693. **Catalogue of visual aids: filmstrips, film loops, accessories.** Educational Productions Ltd., 17 Denbigh Street, London, S.W.1. 5th ed., 1951–52. pp. 36.

Offers (p. 31) 7 filmstrips on timber, its growth, structure and various uses; also one on how to plane.

2694. **Catalogue of visual books and wall charts.** Educational Productions Ltd., 17, Denbigh Street, London, S.W.1. 5th ed., 1951–52.

Offers (p. 20) 8 charts supplementary to the filmstrips, including chemical derivatives, sawmilling machinery, woodworking machinery; also seasoning, planes and lathes.

945.4. *Research*

See also Nos. 2368, 2383–4, 2507.

2695. Resumen de los trabajos más importantes que se vienen realizando en la Estación Regional de Lourizán (Pontevedra). [Summary of the most important work accomplished at the Lourizán Regional Experiment Station.] *Boletín de Información del Ministerio de Agricultura, Madrid* 4 (28), 1951 (50–1). [Span.]

Notes on work in the arboretum, in genetics and in seed testing.

2696. NEVES, C. M. BAETA. A investigação florestal e o futuro da silvicultura portuguesa. [Forest research and the future of Portuguese silviculture.] *Agros* 34 (4/5), 1951 (235–54). 6 refs. [Port.] A.P.B.

A review of the present state of forestry research in N. America and Europe, with a brief history and notes on research in Portugal.

2697. VASCONCELLOS, J. DE CARVALHO E. Aspectos de investigação botânica aplicada. [Aspects of applied botanical research.] *Agros* 34 (4/5), 1951 (175–88). [Port.] A.P.B.

Notes on past work and projects of the Botanical Institute of the Instituto Superior de Agronomia, Lisbon. They include (1) identification of tree species and varieties with a view to their exploitation, and (2) ecological studies with a view to drawing up a vegetation map of Portugal, and planning reforestation.

2698. HEIKINHEIMO, O. Metsätieteellisen tutkimuslaitoksen kokeilualueiden 'ylijäämä'. [Financing the Finnish Forest Research Institute.] *Metsät. Aikak.* 1951 (2/3), (44–5). [Fi.e.]

Discusses the financial position of the Institute, which according to the State Budget is expected like other State enterprises to yield a profit, but which, as research is its main work, does not in fact do so. *From author's summary.*

2699. SKORODUMOV, A. S. Ukrainskiĭ naučno-issledovateljskiĭ institut agrolesomelioracii i lesnogo hozjaĭstva. [The Ukrainian Research Institute for Forestry in Rural Improvement and Forestry Proper.] *Priroda, Moskva* 40 (8), 1951 (64–6). [Russ.] A.P.B.

Reviews the history of this Institute, founded at Kharkov in 1930 and subordinated to various government authorities in the pre-war period. During the war it was almost completely destroyed, but its reconstruction under the Ukrainian Ministry of Agriculture was begun almost immediately after the liberation of Kharkov. At the same time, the forestry authority (now the Ministry of Forests) of the U.S.S.R. also organized a Forest Research Institute at Kharkov to serve the national forest lands of the region. In May 1951, however, the two Institutes were amalgamated under the Ukrainian Ministry of Forests in order to eliminate duplication of effort.

The Institute's research work, from its inception to the present time, has been concentrated upon shelterbelt forestry in all its aspects, the silviculture of forest plantations in the steppes, and erosion control—especially the reclamation of ravines and shifting sands. Recent work has included the development of a planting machine which gained a Stalin prize for its designer, the introduction of species suitable for the purposes mentioned, selection of frost-resistant forms of Walnut and drought-resistant, rapid-growing Oaks, and studies of photoperiodism in woody species, microclimate, and the water régime of soils. The Institute has several substations, e.g. at Mariupol, Vladimirovsk, Partizansk, Pridesnensk and Borkinsk.

2700. **The organisation of post-war silvicultural research [in India and Ceylon].** *Proc. 7th silv. Conf., Dehra Dun 1946*, 1951 (65–93).

Ten papers and summary of debate.

2701. KEEN, B. A. **The East African Agriculture and Forestry Research Organization.** *Nature, Lond.* 168 (4277), 1951 (674–6).

An account of the new building, library etc. at Kikuyu, and the general programme of work, by the Director. [Cf. *For. Abstr.* 13 (No. 1783).]

2702. [WATT, W. E.] **Progress of research activities in South Africa.** *Unasylva* 5 (2), 1951 (64–7).

2703. **Publications of the Northern Rocky Mountain Forest and Range Experiment Station, 1912 through 1950.** *Sta. Pap. Nth. Rocky Mt. For. Range Exp. Sta.* No. 31, 1951. pp. iv + 69.

946.1. *Associations, Societies*

See also Nos. 2383, 2507.

2704. RICHARDSON, S. D. **The Dutch Heath Company.** *J. Land Agents' Soc.* 51 (1), 1952 (15–7):

A short account of the history and activities of the Nederlandsche Heidemaatschappij, including the subsidiary Mutual Forest Assurance Company.

946.2. *Conferences and Excursions*

See also No. 2161.

2705. **Proceedings of the seventh silvicultural conference, Dehra Dun, October 28th to November 6th, 1946.** Army Press, Dehra Dun. 1951. pp. xiii + 639.

Many of the papers have already been published in *The Indian Forester* and noticed in previous issues of *Forestry Abstracts*; others are noticed in this issue under the appropriate subject heads. For resolutions passed at the Conference, see *For. Abstr.* 9 (No. 8).

95. FOREST TAXATION

2706. ROUSSIGNHOL, C. Le fisc et la forêt. [**Taxation and the forest.**] *Forêts de France, Paris* No. 32, 1951 (6–7). [F.] X.

A review of those articles of the French fiscal code that affect forests and forestry.

96. FOREST LABOUR QUESTIONS, LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 2199–2200.

2707. HELLÉN, E. Ehdotus suositukseksi metsäpalkkatilaston laadinnassa. [**A suggestion for forestry wage statistics in Scandinavian countries.**] *Metsät. Aikak.* 1951 (6), (181–3). [Fi.e.]

Statistical methods used in Sweden, Norway and Finland in collecting and collating data on forest wages are compared. A co-ordinated set of comparable statistics on forest wages for the three countries is considered desirable. Recommendations include the following: (1) Collection of data should be done as in Norway. (2) Employers and employees should co-operate in providing data and should check the preliminary data; a state agency should compile the final tables. (3) The period of observation should be fairly long, and local conditions should be studied. (4) The statistics should include information on daily earnings for logging and hauling, January–March; unit wages for logging and hauling logs and firewood, January–March; average hourly earnings in floating and sorting; average daily earnings in cordwood logging, September–November; and daily wages in different forest work on a time basis. *From author's summary.*

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses, Conferences; Excursions*

See also Nos. 2660–1, 2709.

2708. . Semaine internationale du châtaignier Septembre 1950. [**International Chestnut conference Sept. 1950.**] *Bull. tech. Châtaignier Éc. Eaux For. Nancy* No. 3, 1951. pp. 174 + 14 photos, 1 map. Many refs. [F.]

In addition to an account of the conference, its expeditions, and the resolutions passed, the following papers are printed: The die-back of Chestnut stands (*P. Marcelin*, pp. 78–94); The present condition of the Chestnut in the Cevennes (*P. Vieles*, pp. 95–6); Fungus diseases of the Chestnut in France (*R. Rol*, pp. 97–101); *Endothia parasitica* disease of Chestnut (*H. Darpoux*, pp. 102–11); A new disease of Chestnut —*E. parasitica* (*J. Ginet*, pp. 112–3); Influence of site factors on the propagation of fungus diseases of Chestnut (*E. Gonzalez Vazquez*, pp. 114–6); Chemical control of Chestnut ink disease (*P. Urquijo Landaluze*, pp. 117–26); Chestnut breeding in France (*C. Schad, Solignat, Venot*, and *Villaxy*, pp. 127–44 with 65 refs.); Utilization of Chestnut wood (*C. Poilleux*, pp. 145–9); Tannin extraction in Italy (*M. Sormani*, pp. 150–2); Control of insect pests of Chestnut, *Laspeyresia splendana* and *Balaninus elephas* (*B. Trouvelot*, pp. 153–7, with 11 refs.); The restoration of Chestnut stands in relation to rural economy (*H. Millischer*, pp. 158–65); The importance of the Chestnut in Switzerland (*A. Arrigoni*, pp. 166–7); Origin and present distribution of the Chestnut (*P. Guinier*, pp. 168–174, with 16 refs.).

972. *Organizations*

See also Nos. 2660–1.

2709. **Sixth session FAO Conference, 1951: item V-23 of the provisional agenda. Administrative organization of FAO.** FAO, Rome. 1951. pp. iii + 9.

Forestry Division pp. 6–8.

2710. **Program of work, 1952–1953.** FAO, Rome. 1951. pp. 89.

That for forestry (pp. 54–64) enumerates separately, under the 3 newly constituted units of the Division, (*a*) continuing projects, (*b*) projects to be started in 1952, and (*c*) ditto 1953. Supplementary projects, to be carried out only if additional funds can be found, are listed separately.

FORESTRY THE WORLD OVER

References: 1. *American Forests*, Washington; 2. *Anglo-Swedish Review*, London; 3. *Australian Timber Journal*, Sydney; 4. *Bollettino ufficiale del Corpo forestale dello Stato*, Rome; 5. *British Columbia Lumberman*, Vancouver; 6. *D.S.I.R. Press Release*, London; 7. *Empire Forestry Review*, London; 8. *Foreign Commerce Weekly*, Washington; 9. *Forêts de France*, Paris; 10. *India News*, London; 11. *Journal of Forestry*, Washington; 12. *Lesnaja Promyšlennostj*, Moscow; 13. *Mundo Maderero*, Buenos Aires; 14. *Nature*, London; 15. *Pulp & Paper Magazine of Canada*, Quebec; 16. *Quarterly Journal of Forestry*, London; 17. *Southern Lumberman*, Nashville, Tenn.; 18. *Timber Trades Journal*, London; 19. *Timberman*, Portland, Ore.; 20. *Times*, London; 21. *Wood Saver*, Midland, Mich.

Conferences. In 1950, Unesco established an Interim International Arid Zone Research Council to survey the scientific problems presented by the arid regions of the world. This Council met in Paris in Nov. 1950, and put forward a programme of activities in this field and also recommended that Unesco should set up a standing Advisory Committee on Arid Zone Research to supervise the carrying out of the programme. This Committee of 9 members was duly appointed and held meetings at Algiers in April and in Paris in Sept. 1951. The two principal means by which it is proposed to collect and discuss existing knowledge are reports and symposia. The first subject chosen was the hydrology of arid zones with especial reference to underground water: eight authors have written reports and a symposium on the subject has been arranged jointly by Unesco and the Turkish Government, and will take place in April 1952, at Ankara. The second field chosen is that of the plant ecology of arid areas. In 1952 reports will be obtained dealing with the plant ecology of the main arid areas, and these will be followed by a symposium which it is proposed, if possible, to arrange in one of the Latin American countries. This coincides with the decision of the Institute of Biology to hold a conference in London, on the biology of hot and cold deserts, in Sept. 1952.

Other projects are the publication of a series of 'homoclimatic' maps setting out the principal meteorological features of the desert regions, and the preparation of a directory of research centres concerned with arid-zone problems (**14**; 5.1.52).

Argentina. A forest research station is being set up in Rivadavia department, Mendoza, to carry out research on suitable timbers for posts and packing containers, and species for shelterbelts, hedges etc. (**13**; Nov. 1951).

Australia. To ensure that their requirements of both short- and long-fibred pulps will be met by Australian supplies, Australian Paper Manufactures Ltd. have formed a special company, A.P.M. Forests Pty. Ltd., to plant large areas of *Pinus radiata* in Gippsland, Victoria, and to maintain *Eucalyptus* forests on a sustained-yield basis. It is hoped that between 2,000 and 3,000 acres of *P. radiata* will have been planted in the Gippsland area during 1951. Two million seedlings will be planted by 6 machines capable of planting between 50,000 and 60,000 seedlings a day. The first pulpwood from the area will be produced from thinnings in about 1962. Full-scale production will begin in 1966 (**3**; Nov. 1951).

Canada. The province of New Brunswick and the New Brunswick International Paper Company are to share the cost, estimated at half a million dollars, of an attack on Spruce budworm on the headwaters of the Southeast Upsalquitch river in Restigouche County. Balsam Fir and Spruce stands totalling 2,000,000 cords are threatened. The science service of the Federal Department of Agriculture is giving technical assistance, and a number of scientists have been assigned to the campaign. Up to 24 light aircraft specially equipped for spraying and 200,000 gallons of formulated DDT are to be used. The work on the 200,000-acre area must be concentrated into the 3 weeks when the budworm is most vulnerable to insecticide, and spraying will be done only in the early morning. An airfield and temporary housing for about 100 men are being constructed during the winter (**15**; Jan. 1952).

A new system of spraying with Permatox 10-S is in operation at several Canadian sawmills. The lumber comes off the planer on to an endless belt which carries it through the spray cabinet on to the sorting chain for grading. Banks of 4 spray jets at the 4 corners of the cabinet ensure effective spraying of all the lumber. The solution drains through a series of filters under the cabinet for removal of all scrap, sawdust etc., and is then returned to a supply tank under the floor. The system requires 20-lb. pressure supplied by a centrifugal pump with a self-priming trap and strainer and a capacity of about 10 gal./min. One such installation has handled 250,000 bd. ft. in one 8-hr. shift (**5**; Dec. 1951).

Flooring of 'compregnated' Cedar and Alder and other soft woods has been tested alongside hard woods at the entrance of the University of British Columbia Faculty Club. After 18 months the 'compregnated' woods showed less wear than Oak; their surface was little changed, whereas Oak showed severe grain-raising and etching and needed re-surfacing (**19**; Dec. 1951).

A co-operative project on the use of sawmill residue as a soil conditioner has been started by the B.C. Lumber Manufacturers' Association, the Forest Products Laboratory and the soils department of the University of British Columbia. Soil samples are being taken at depths of 6, 18 and 36 in. from strawberry field plots in Lower Fraser Valley farms; plots range from those with no sawdust mulch to those covered with 4 in. of sawdust, with and without irrigation. Samples are examined for their moisture-holding capacity, structure and aeration, and available nitrogen content, and tests are made to find whether decomposition of sawdust will increase the ability of the soils to hold plant nutrients in readily available form. Pot tests are also being made in the University greenhouses to determine physical and chemical changes in soils as a result of incorporating different kinds, sizes and amounts of sawdust (**5**; Jan. 1952).

France. The Exposition Internationale du Bois held at Lyons 23 Sept.–7 Oct. 1951, for the encouragement of trade in wood and allied products, was the first of its kind to be held at Lyons. Nearly 300,000 persons visited it, of whom 3,000 were foreign visitors from 47 countries. Exhibits included woodworking machinery and tools, furniture, parquet floors, plywood and veneers, building equipment, trucks, tractors, pit props, tropical woods etc. (**8**; 26.11.51).

For the higher ranks in the forest service, the designations *Inspecteur général* and *Conservateur* are being retained, but under a decree of 22 Dec. 1950, the various gazetted ranks of *Inspecteur* are now designated *Ingénieur*, while *Brigadier* and *Garde* are now *Agent technique principal* and *Agent technique* respectively (**7**; Dec. 1951).

Pilot-scale experiments in the hydrolysis of tropical African woods by the Hareng process have been successful, and it is hoped soon to employ it on a commercial scale (**9**; Dec. 1951).

Great Britain. Two cases have recently been observed of disease in the Cricket Bat Willow caused by the fungus *Cryptomyces maximus*. This fungus has been present for a long time on other willows but has not hitherto been recorded on this species. The symptoms are seen in the stool beds, where the shoots in autumn show large flat cankers which at first appear like blotches of tar 3–4 in. long and 1–2 in. wide. Later the bark under the spot dies and dark-coloured cankers are formed which make the shoots useless as sets. Any growers who notice such symptoms are asked to communicate with W. J. Dowson and N. F. Robertson, Botany School, Downing Street, Cambridge (**16**; Jan. 1952).

Recently completed additions to the testing facilities of the Forest Products Research Laboratory, Princes Risborough, include a large building equipped for testing timber structures such as floors, roof trusses and girders, and rooms for testing glues and glued-wood products in tropical conditions. In the timber-testing building, work can be done on structures up to 38 × 26 ft. in area, under a maximum load equivalent to a distributed load of 3 cwt./sq. ft. It will be possible to test trusses, girders and similar structures up to 70 ft. long, and arches up to 38 ft. span and 26 ft. high under loads up to a maximum of 1½ tons/ft. of span. In the tropical testing rooms, the daily cycle of heat and humidity for different places can be reproduced for long periods, through a system based on cam-operated controlling mechanisms. One side of the building has a room simulating wet conditions and the other side provides dry conditions. There is also a workroom fitted with infra-red lamps to simulate solar effects (**18**; 26.1.52).

Investigations are also being carried out at Princes Risborough for the National Gallery, to try to find a practical method of preventing cracking and other damage to paintings on wood, caused by atmospheric changes. Experiments are being made in the application of moisture-proof coatings to the backs of wood panels (**6**; 14.12.51).

The 'Kwik-Cut' power-saw for tree brashing and pruning, which won a silver medal in the new implement section of the Royal Highland Show this year, is now being manufactured and distributed in 4 models by the inventor, Alexander Forbes, Lochgilphead, Argyllshire. The machine, which weighs 20 lb. including fuel, comprises a 6-in.-diameter circular saw (depth of cut 2⅛ in.) driven through a shaft from a ½ h.p. petrol motor. The most elaborate model has an adjustable telescopic driving shaft, so that the length of the machine can be varied between 2 ft. 10 in. and 3 ft. 8 in., plus a swivelling saw blade, which can be fixed to cut vertically, horizontally and at any intermediate angle. Another model is in the form of a portable saw-bench fitted with an adjustable fence. Running costs of the saws are low, 1 pint of petrol being sufficient for 1½ to 2 hrs. working (**18**; 15.12.51).

India. After nearly 3 years' research, good-quality newsprint ink, and duplicating and stamping inks, are being produced in a plant set up at the National Physical Laboratory, New Delhi, and it is hoped that commercial production will soon begin. A novel feature of this process is the use that is made of a liquid obtained from cashew-nut shells and allied resinols, of which India has almost a monopoly (**10**; 15.12.51).

Italy. An agreement has been made between the State Forest Service and the Ministries of Education, Labour, and Home Affairs, to stimulate public interest and zeal in the celebration of the Festa degli Alberi, or Arbor Day. In future it will be held on 21 November, except in mountain villages or in particularly adverse seasons, when it may be postponed to March. All local authorities, religious bodies, schools etc. are to participate. In addition to speeches, cinema shows, songs, processions etc., the celebrations should include the planting of trees (**4**; Oct. 1951).

Mexico. The newly completed Southeast Railway linking the heavily forested states of Yucatan, Tabasco, and Campeche with Northern Mexico and the United States, will transform Mexico into one of the wealthiest timber countries in the world, whereas a year ago there was such a shortage of wood that none could be spared for building. The tropical forests along the coasts consist of very large trees with diameters of 4–7 ft. and it is estimated that the better stands carry 10,000–15,000 bd. ft./acre (**1**; Oct. 1951).

Sweden. A Swedish ship, sunk by mine explosion in 1947 in the waters between Denmark and Sweden, and still impeding traffic in the Sound, is to be salvaged. The ship was carrying 2,000 tons of wood pulp, which is said to be in excellent condition and worth 4 times its 1947 price (**2**; Oct. 1951).

Tanganyika. Tanganyika produces about 650 long tons of beeswax annually. The Government has recently appointed a specialist who will attempt to increase output by educating farmers to consider the product as a crop and adopt conservation measures. It has been a widespread practice to seek out beehives in hollow trees in the bush and to cut down the trees to get at the hives more easily (**8**; 26.11.51).

U.S.A. A synthetic substance which is said to be capable of converting non-productive into productive soil in a matter of hours, was demonstrated at the annual meeting of the American Association for the Advancement of Science at Philadelphia, 29 Dec. 1950. The substance, a powder called Krilium, is not a fertilizer but a soil conditioner, a synthetic substitute for natural humus components. It enables plants to obtain optimum amounts of oxygen and water and of soil nutrients. The primary effect is to stabilize natural soil aggregates against the dispersing and slaking action of water. Krilium has been extensively tested during the last 3 years by the Monsanto Chemical Company which developed it, and by about 80 soil scientists in various parts of the United States. It is a poly-electrolyte and carries negative electrical charges that appear to react with the positive charges in the mineral constituents of the soil, to give the soil its proper structure. The new chemical will not be available in quantity until 1953, but a $50-million plant is being constructed in Texas to produce acrylonitrile, the primary material for Krilium. In the early stages of production Krilium will be sold for something less than $2/lb. One pound of it is said to have the same effect on soil structure as 200 lb. of peat moss (**20**; 30.11.51).

TVA is taking part in a programme of research into the genetics of Southern Pines sponsored jointly by private and public research agencies. The two TVA forest nurseries produce about 20 million Pine seedlings a year, and in each of the next 5 years foresters will select the best Loblolly, Shortleaf and White Pine seedlings at the rate of one for every 200,000 produced. These will be planted in test plots with a number of average seedlings as controls. The plots will be examined at 5-year intervals, and material that fails to maintain its superiority and controls that fall below the average will be removed. Trees remaining at the end of 20 years (perhaps $\frac{1}{8}$ of the original number) will be used for seed production, grafting, and breeding experiments (**17**; 1.12.51).

The South Carolina State Commission of Forestry is trying a new approach to the problem of removing undesirable hardwoods from land to be planted with Pine. Between 600 and 800 acres are being leased at a nominal fee to watermelon growers, who need new ground every year because of soil-borne diseases. The watermelon growers clear the land of Scrub Oak in the spring, grow a crop of matermelons, and return the land to the State for planting with Pine in the autumn (**17**; 15.12.51).

In the Clearfield, Pa., district during recent years, power transmission poles have been so badly damaged by bears that they became unsafe and had to be replaced. It is believed that the bears hear the humming caused by the wind blowing against the power lines and think that there are bees inside the poles. [Cf. *For. Abstr.* 10 (p. 146)] (**21**; Nov. 1951).

A jury has awarded damages of $8,500 to a houseowner against a timber merchant who delivered and installed green Douglas Fir joists instead of the air-seasoned lumber specified. The timber merchant admitted that he delivered 'scant' nominal 10-in. joists of 9¼ in. height with up to 25% moisture content that had been stacked in his yard without stickers. The resultant damage included settlement of the first-floor flooring and built-in furniture; cracks, splits and openings in floors and partition walls; deformation of interior door frames, and jammed doors; local buckling of sheet-metal ducts nailed to the joists; and open mortar joints between brick facings and joists (17; 15.12.51).

Baseball bats with a central band of Hickory and outsides of Ash have been tested with good results, and have now been approved for inter-collegiate games, though major league rules still require a solid bat. It is expected that the laminated bats will last longer, will help to conserve supplies of Ash, and will create a new market for Hickory (17; 15.12.51).

A plan has been devised for saving materials and money by increasing the length of planking used in naval vessels and thus reducing the number of bronze fastenings between the timbers. Basically the plan consists in adopting glued scarf (or notched) joints in the specifications for planking wooden minesweepers. A vertical V-scarf will be used and adhesives of an intermediate-setting type, durable in salt water, will be used. Instead of using only solid members in planking wooden ships, shipbuilders will be encouraged to use the new scarfed material which can be furnished in any lengths. It is estimated that by increasing the average length of planking in a minesweeper from 24 to 32 ft., about one-third of the butt joints could be eliminated, thus saving nearly 2,000 bronze fasteners, each of which costs about $10.00 (11; Jan. 1952).

U.S.S.R. Yarding trials in Leningrad Province in 1950, using the TL–3 power winch and a single mast or spar tree, have shown that it is more efficient to bring in whole trees with their crown intact than tree-length logs previously trimmed of all their branches at the felling site. In the former case it is better to yard top first than butt first, because with the top forward, elevated and partially supported by the branches, the trees are rarely caught up on stumps etc. In spite of the fact that the number of whole trees per 'bundle' yarded is necessarily fewer than in a bundle of trimmed trees, almost twice the number of hauls per shift can be made with the former method, and since there is no need for men to follow the bundle to the dump, their time can be used on other jobs. Average output per shift is increased by 16% (54 as compared with 47 cu.m.). Further, trimming and slash burning are concentrated at the log dump and their efficiency also increases: only 5 instead of 8 men were required for this job and the output per man-day of these 5 was almost double that of the 8 workers on the felling site (10·8 cu.m. as compared with 5·7 cu.m.). Slash fires can be kept burning continuously, branches were trimmed closer and with cleaner cuts, the logs were not charred (as often happens when slash is burnt on the felling site) and the work was safer. Centralization of this work also increases the opportunity for mechanization and for the utilization of branchwood as fuel or for chemical conversion. Slash burning as practised at present must give way as soon as possible to such forms of utilization (12; June 1950).